Options for Managing Space Station Utilization

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Prepared by:

Swales Aerospace

5050 Powder Mill Road

Beltsville, MD 20705

Table of Contents

1. EXECUTIVE SUMMARY

This study identifies dominant characteristics, strengths, and weaknesses for a range of non-government organizations (NGO) for managing the utilization of the U.S. elements of the International Space Station (ISS). The five viable options, listed in order of increasing independence from NASA, are NASA Institutes, Consortia, Government Corporations, Government Sponsored Enterprises, and Cooperative Associations. Examples are given for each option highlighting their primary distinguishing characteristics. Most afford financial and management flexibility, relief from restrictive regulations, and some operating cost reduction possibilities. For most, enabling legislation will be required dealing with a) commingling commercial objectives with more traditional research and development, b) liability waivers and indemnification guarantees for its semi-private status, c) exemption from (some) procurement regulations and the Freedom Of Information Act, and d) joint-tenancy for ISS resources with NASA and its International partners.

Non-governmental sources of non-recurring and recurring funds are identified for each option but subsidies and grants will undoubtedly be important in the early phases of ISS operation. In the longer term, self-sustaining operation of the ISS facilities will depend upon the commercial sectors success in using the ISS. Two sources of funding are particularly noted, viz., royalties derived from sales of products created using ISS-developed technology, and access fees for discretionary use by commercial entities. The start-up funding depends upon the approach used to establish the NGO. The approaches identified, in addition to either state or federally mandated, are procurement contracts, grants, cooperative agreements, and Other Transactions.

2. INTRODUCTION

The purpose of this study is to characterize the different organizational options for managing the utilization of the International Space Station and define metrics or features for selecting an optimum approach which is consistent with the objectives and terms stated in the Space Act. The term utilization refers to all activities leading to and performing research, technology development, and commercial process development either as an ISS attached payload or within the pressurized laboratories.

The reduction of costs to provide greater access to space and encourage the growth and innovation of scientific research is a primary aim of the Space Station utilization plan. It is generally assumed that reducing the cost of integration, qualification and launching of payloads encourages greater industry participation and public interest in the Space Station. However, we also need to seek innovative ways of conducting business in order to realize meaningful cost reductions.

2.1. Definition of a Non-Government Organization

A Non-Government Organization (NGO) is being considered as an alternative operational entity for managing the utilization of the International Space Station (ISS). A strawman description[1] of such an approach has been developed by NASA for discussion purposes.

> Definition of Terms
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> An NGO is defined as a financially self-sustaining[2] enterprise serving the general public by providing goods or services that are not available through standard commercial means. Although by definition, an NGO is not part of the government, the government often does participate in the overall management of the NGO by virtue of its membership on the NGO Board of Directors. In addition, the overall policy and direction of the NGO can be established through the terms of its charter as stipulated in its enabling legislation.

Using an NGO approach essentially privatizes both the management and operational functions associated with conducting research, technology development and commercial uses of the ISS. This enterprise is subject to the provisions of Title 31 and/or Government Corporation Control Act (31 USC 91). It is not necessarily fully federally or state funded or operated. In contrast, a Government Organization (GO) is one wholly funded by the Government and managed by government personnel, e.g., an executive agency.

This report considers a range of viable possibilities for implementing an NGO including:

- Government and/or Public Corporations
- State Agencies or Authorities
- Government Sponsored Enterprises
- Consortia/Institutes
- Cooperatives and Associations
- NASA Institutes and Commercial Space Centers

The two more traditional GO options not being considered include direct management by NASA Headquarters using either Field Centers or other Federal Agencies. A Principal Investigator (either University or Commercial based) approach was not considered appropriate for an operational vehicle with multiple experiments, and therefore is not discussed here.

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[1] "Reference Model of A Non-government Organization for Space Station Utilization Management". M. Uhran, NASA Headquarters, Code UM. October 1998.

[2] Self-sustaining does not preclude receiving subsidies from the government.

The viability of using an NGO is well established in many national and international endeavors. Examples of NGO types are described in Section 3. Under the Space Act[3], Title 42, chapter 26, subchapter 11, NASA is empowered to either conduct or arrange for the conduct of scientific measurements and, also, to encourage the fullest commercial use of space. It also serves as the provider of access to commercial space services for Federal government use. To accomplish these goals, NASA is empowered to acquire (by purchase, lease, condemnation, or otherwise), construct, improve, repair, operate, and maintain laboratories, research and testing facilities, space vehicles", etc. NASA also may "…sell and otherwise dispose of real and personal property (including patents and rights thereunder") in accordance with the provisions of the Federal Property and Administrative Services Act of 1949, as amended[4]. An interpretation of this provision is that if NASA were to relinquish control of a space asset, it would still serve as the agent for negotiating access to space/ground assets which it no longer "controls". The Space Act also stipulates that NASA may "accept unconditional gifts or donations of services, money, or property." An important provision of the Space Act is that NASA is authorized "to enter into and perform such contracts, leases, cooperative agreements, or other transactions as may be necessary in the conduct of its work and on such terms as it may deem appropriate, with any agency…, state, …person, firm, association, corporation, or educational institution." This provision defines the range of both parties and instruments that can be employed to conduct its business; these will all be considered in this study.

2.2. Why an NGO

Congress, through the 1998 Commercial Space Act[5], states its objective as to encourage the development of a commercial space industry and to reduce the cost to the Government of operations. These requirements or objectives establish the framework for selecting the approach for managing ISS utilization. Three principal reasons provide a basic rationale for using an NGO rather than a government entity itself. They are:

- Relief from binding regulations
- Financial and management flexibility
- Reduced cost of ISS utilization.

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[3] Reference: 42 U.S.C. Sec. 2473

[4] Reference: 40 U.S.C. 471 et seq.

[5] "…The Congress further declares that the use of free market principles in operating, servicing, allocating the use of, and adding capabilities to the Space Station, the resulting fullest possible engagement of commercial providers and participation of commercial users, will reduce Space Station operational costs for all partners and the Federal Government's share of the United States burden to fund operations." Commercial Space Act of 1998, sec. 101, entitled Commercialization of Space Station.

This rationale supports the Congressional objective as well as encompassing the principal requirements of users, sponsors and investors[6]. The ISS user's needs can be conservatively assumed to be that securing access to the ISS must be equitable, execution of experiments or programs needs to be assured and timely, and the costs for project development, integration and operation aboard ISS must be consistent with the expected scientific or business return. In addition, for a commercial user, the cost-benefit of ISS utilization should be competitive in the space market and quantifiable in real dollars. From a sponsor's or investor's perspective, the management approach should minimize non-productive overhead cost, provide equitable management control in proportion to the investment, and have a capability of attracting new capital investments.

Many precedents exist for NGOs. Some of the more familiar examples are discussed in the next section.

3. MANAGEMENT APPROACHES

This section characterizes the various management options along with examples highlighting key features.

3.1. Definition of Corporation

A corporation may be defined as a legal entity, enabled by legislation, that permits a group of people, either as shareholders (for-profit companies) or members (non-profit companies), to create an organization which can then focus on pursuing set objectives, and which is empowered with legal rights. In general terms, the three types of corporations are: Public, in which stock can be owned by the public at large; Private, which is owned by its employees or a select group of shareholders; and Government, in which stock is wholly or partially owned by the government. Although somewhat misleading, a Government Corporation is often termed a "Public Corporation" because it is established and governed for the public good through the auspices of the Government. In this study, we shall use these synonymously. The traditional commercial corporation could serve to implement tasks from an NGO under contract or subcontract to it but would not be a viable management entity for the NGO itself initially. Also, a Government Corporation can indeed transition to becoming a traditional public one. In the context of implementing an NGO, we shall later redefine "Private Corporation".

3.2. Government Corporation

[6] In this study, it is assumed that the "investor" provides funds for disbursement by the NGO for either philanthropic or business reasons. In effect, the NGO serves as the arbiter of entrepreneurial funding.

A Government Corporation (GC) is an important version of a Non-Government Organization. Government Corporations are incorporated under and subject to the Government Corporation Control Act, Title 31 (31 USC 91). Although there are many definitions of GC, the one provided by NAPA[7] is heuristically useful and will be adopted here.

A wholly owned GC in general:

- Pursues a government mission assigned by its enabling statute
- Is financed by government funding (appropriations)
- With assets owned by the government (either in whole or in part), and
- Is controlled by a Board appointed by the government (President).

According to OMB[8], the conditions where using a GC is appropriate are:

- The operation is primarily businesslike
- It primarily sells goods and services
- Is substantially self-financing
- There is likely a continuing demand for its goods or services
- There is an absence of a commercially competitive market for the goods or services
- There is a need to continue services to an unprofitable market
- It serves public not private purposes

Examples of wholly owned GC's include:

- Alternative Agricultural Research and Commercialization Corporation
- Commodity Credit Corporation
- Corporation for National and Community Service
- Export-Import Bank
- Federal Crop Insurance Corporation
- Government National Mortgage Association
- Panama Canal Commission
- Pennsylvania Avenue Development Corporation
- Pension Benefit Guaranty Corporation
- St. Lawrence Seaway Development Corporation
- Tennessee Valley Authority
- Uranium Enrichment Corporation

and examples of mixed ownership GC's:

- Central Bank for Cooperative
- Corporation for Public Broadcasting
- Federal Deposit Insurance Corporation
- Federal Home Loan Banks
- Federal Land Banks
- Financing Corporation

[7] NAPA, Report on Government Corporations, Vols. I-II, Washington, D.C. 1981.
[8] Government Corporations. OMB M-96-05, A. M. Rivlin

- National Railroad Passenger Corporation (AMTRAK)
- Resolution Funding Corporation
- Resolution Trust Corporation
- United States Railway Association

Note however, one finds examples of wholly owned GC's, such as TVA, which commingle funding, i.e., supplement the federally provided appropriation. In addition, there is a mixed-ownership version of a GC that involves both public and private equity, control by a Board selected by the government and private stockholders, and shared ownership of assets. To confuse the issue of definition, a private (non-profit) corporation, such as the Corporation for Public Broadcasting, claims independence from statutory regulations while its Board is appointed by the President and all its funding is derived from federal funding.

Government Corporations are established to carry out business type programs that need a high degree of autonomy, flexibility, and business oriented enterprise (i.e., sell goods or services to the public). They fall in to three general categories: producing utility type services (TVA), producing financial or insurance services (Crop insurance program), and grant institutions (OPIC). However, many of the business-oriented enterprises would not otherwise succeed without government funding.

Federal Government Corporations are favored by Congress when the mission is basically commercial and it is necessary to establish a company that meets needs not provided by private sector goods and services. Few GC's operate in highly competitive markets. By organizing the entity along corporate lines, it is believed that the transition to privatization — wherein the Federal share of equity is bought out — can be facilitated. Almost all GC's have the power to sue and be sued, make contracts, hold property, and to borrow funds. Most are governed by a Board of Directors elected by either shareholders or appointed by the President (sometimes subject to Senate confirmation). Many are exempt from civil service rules, the Freedom Of Information Act (FOIA), and even the Government Corporation Control Act (GCCA)[9] which was intended to regulate how GC's are created and supervised. However, the GCCA does prohibit the Executive branch from creating new GC's without explicit legal authorization. Financially, most partially owned government corporations are exempt from use-or-lose rules regarding unexpended funds, can enter into multi-year commitments, issue stock, and buy or sell assets without complying with federal procurement and disposal regulations. In wholly owned GC's, the government holds 100% of the equity and exercises 100% of the votes on the Board. In mixed ownership GC's such as the Resolution Trust Corp., the Government may own some or none of the equity. Their charter usually guarantees that the President will appoint at least a minority of the Directors and the market assumes that securities and other debt instruments carry an implicit guarantee from the federal government. The federal

[9] 31 USC 9101, et seq.

government holds no stock in private GC's, such as COMSAT, but may reserve the right to select Board members.

Financially, one of the major advantages of a GC, aside from increased efficiency and providing a “captive” agency for a particular constituency, is that it may be given “off budget” status insulating it from Gramm-Rudman-Hollings budget reductions or spending caps. This exemption may enable an activity to survive in an otherwise hostile budget-cutting environment. One of the main disadvantages of a GC is that vesting ownership in the targeted beneficiaries may create significant conflicts of financial interests albeit maximizing profit return to the venture. Another small disadvantage is that a GC borrows at a premium rate compared to that available to the Treasury but still lower than to a private corporation. A third disadvantage, which could arise if privatization is the ultimate goal, is the prospect of failure that, in turn affects the risk associated with investing in the GC.

Several GC's, because of their similarity in purpose to the ISS NGO which also have a broad, international scope of operations include:

- COMSAT
- INTELSAT
- International Development Research Center (Canada).

3.2.1. Communications Satellite Corporation (COMSAT)

COMSAT is a well-known example of an aerospace related Government Corporation. Most foreign aerospace companies are partially government owned; similar examples include Aerospatiale (48% French Government owned) and Alenia (Italian Government owned). COMSAT develops advanced satellite communications technologies. The corporation provides technical consulting services and develops market-driven wireless networking products for commercial and government customers worldwide. COMSAT's digital networking business provides multinational corporations and other companies in emerging international markets with all the capabilities, services and resources they need for start-to-finish networking solutions, regardless of existing local telecommunications infrastructure.

Founded as a US Government Corporation in the 1960’s, COMSAT received money to become the first vendor in the international satellite communications business, and still holds a reasonable share of the business. It received government spectrum licenses that only recently became available to private corporations, and it has amassed a stable and experienced workforce over the past thirty years. It has broadened its reach to offer a more comprehensive range of service and compete with networking technologies.

Originally, the Communications Satellite Act of 1962 subjected COMSAT to special restrictions. After 1985, the FCC authorized several international satellite systems separate from INTELSAT and, in 1993, the FCC substantially eliminated prior restrictions for competitors, thereby increasing market competition. In 1997, COMSAT began lobbying to reduce restrictions specific to COMSAT in order to become more competitive.

FCC regulation of the corporation's capital structure and debt financing activities limits COMSAT to $200 M in debt, and a maximum long-term debt to capital ratio of 45%, and interest coverage ratio of 2.3 to 1, though the FCC does regulate the debt ratio of all satellite providers.

3.2.2. AMTRAK

AMTRAK is a mixed ownership government corporation that essentially has a monopoly over passenger train service in the United States. It receives Federal subsidies that equal roughly $350 M a year. However, AMTRAK has always operated at a loss and depends on the subsidy. AMTRAK's liability potential also impacts its profitability. Amtrak is subject to the FOIA provisions, Government Corporation Control Act, and general accounting requirements, but is otherwise exempt from many other provisions such as FAR and pay scale limitations.

3.2.3. Panama Canal Commission

This entity was established as a wholly owned U.S. Government Corporation within the Executive Branch by the Canal Act of 1979. It operates, maintains and improves the Canal. It is supervised by a 9-member Board with 5 from US, appointed by the President with advice from the Senate, and 4 from Panama.

3.2.4. International Development Research Centre

IDRC is a public corporation created by Canadian Parliament to help researchers and communities in developing world solutions to social, economic and environmental problems. It is organized into 11 Secretariats, overseen by independent Steering Committees who ensure that appropriate research priorities are maintained. It is governed by a 21-member international Board, 11 of which are from Canada. A Senior Management Committee oversees the direction and strategies employed. It is empowered to enter into contracts or agreements with governments, public or private corporations, and individuals. It is government funded but may acquire and dispose of contributions.

3.3. State-Based Corporations

Several examples of organizations with similar objectives to the ISS NGO that are State sponsored include:

3.3.1. Spaceport Florida Authority

Established in 1989 and empowered under Chapter 331, Part Two, Florida Statutes, the Spaceport Florida Authority (SFA) is responsible for statewide space-related economic and academic development, including regulatory and operational support to the space transportation industry. It has supported over $200 million in new industrial and federal space program investments statewide. Its mission includes:

Space Transportation -- The SFA operates much like an airport or seaport authority, providing infrastructure, access and operational support for expendable, reusable, and suborbital launch vehicle programs.

Economic Development -- It works with industry and local, state and federal agencies and elected officials to support space-related programs and investment in Florida. The SFA provides financing, advocacy, technical support, business incentives, and facility/infrastructure development for space-related projects.

Academic Development -- The SFA works closely with public and private universities and colleges in the state to increase their involvement in space-related research and education.

The Spaceport Authority's executive director reports to a nine-member board of supervisors appointed by the governor and legislature. Seven board members are appointed by the governor, serve two and three-year terms. Two board members are appointed each by the leadership of the Florida Senate and House of Representatives. These legislative appointees are non-voting members of the board. The board holds quarterly public meetings, usually near the Cape Canaveral spaceport.

3.3.2. Tellico Reservoir Development Agency (TRDA)

TRDA is a non-profit public corporation created by the State of Tennessee that operates much like a private company. It is controlled by a nine-member board of Directors and is directed by an Executive Director who has the responsibility for the day to day operation and management of the Tellico Lake Project. The Agency is empowered by state law with authority to provide a broad range of services to the Project.

3.3.3. Alabama Supercomputer Authority (ASA)

The ASA is an Alabama public corporation that develops and operates the statewide Alabama Research and Education Network and the Alabama Supercomputer Center. It is governed by a 16-member Board, appointed by the Governor, Lt. Governor, and Speaker, which sets policy and direction. Funding comes from the Alabama Education Trust fund, sales of services to industrial firms, and from federal contracts and grants. Facilities are made available at published commercial rates.

3.3.4. Kansas Technology Enterprise Corporation (KTEC)

The KTEC is a quasi-public corporation established by the state to promote advanced technology economic development. Funding is provided by the State Legislature from lottery and racing commission funds leverage with private sector and federal funds, employing a return-on-investment philosophy. KTEC is governed by a 20-member Board of individuals from the private sector, government and academia.

3.4. Government Sponsored Enterprise (GSE)

In addition to the standard Government Corporation, another category of GC has been introduced designated as Government-Sponsored Enterprises. These are characterized as:

- Typically financed by private investors
- Privately owned or controlled
- Regulated by the Government to protect its interests
- Profit seeking

GSE's are a special form of a GC limited by Congress to lending to a particularly constituency coupled with explicit or implicit federal guarantees allowing them to offer subsidized loans. According to the congressional definition of a GSE, its applicability as an NGO approach for utilization management is questionable. It could be appropriate only when functioning as a source of venture capital for commercial development.

GSE are chartered by the Government, with special privileges such as lending powers, to accomplish public purposes. They must have a clearly articulated “exit strategy” and an express sunset date. A key feature of a GSE is that it is perceived to have the full faith backing of the Government. GSE's can become privatized afterwards under appropriate conditions. Examples of GSE's include:

(a) Student Loan Marketing Association (Sallie Mae)
(b) Federal Home Loan banks system institutions (FHLBs)
(c) Federal National Mortgage Association (Fannie Mae)

3.4.1. Fannie Mae

This GSE was created by government charter and operated as a government entity from 1938-1968. In 1968, it was converted to a private company with common stock that is publicly traded. The Charter Act (12 U.S.C. § 1716 *et seq.*) enacted in the Housing and Urban Development Act of 1968 (the 1968 Act), the Federal National Mortgage Association was divided into two separate institutions, the present Corporation and the Government National Mortgage Association (Ginnie Mae), a wholly owned corporate instrumentality of the United States within HUD which carried on certain special financing assistance and management and liquidation functions. Under the 1968 Act, Fannie Mae was constituted as a federally chartered corporation and the entire equity interest in Fannie Mae became stockholder-owned.

Although the 1968 Act eliminated all federal ownership interest in Fannie Mae, it did not terminate government regulation of the Corporation.[10] Under the Charter Act, approval of the Secretary of the Treasury is required for Fannie Mae's issuance of its debt obligations and Mortgage Backed Securities (MBS). In addition, the 1992 Act established OFHEO, an independent office within HUD under the management of a Director who is responsible for ensuring that the Corporation is adequately capitalized and operating safely in accordance with the 1992 Act. The 1992 Act not only established minimum capital, risk-based capital, and critical capital requirements for Fannie Mae but also required the Director to establish a risk-based capital test to be used to determine the amount of total capital the Corporation must have to exceed the risk-based capital level from time to time. OFHEO issued a final rule (the "Rule") in 1996 related to the minimum capital levels for Fannie Mae and Freddie Mac that sets forth how minimum capital requirements for both entities are to be calculated, reported, and classified on a quarterly basis. The Rule, which finalized an original proposal dated June 1995, formalized the interim capital standards applied by OFHEO, with which Fannie Mae has been in compliance since their inception.

Under the 1992 Act, the Secretary of HUD retains general regulatory authority to promulgate rules and regulations to carry out the purposes of the Charter Act, excluding authority over matters granted exclusively to the Director in the 1992 Act. The Secretary of HUD also must approve any new conventional mortgage program that is significantly different from those approved or engaged in prior to the 1992 Act. The Secretary is required to approve any new program unless it is not authorized by the Charter Act of the Corporation or the Secretary finds that it is not in the public interest. However, until one year after the final regulations establishing the risk-based capital test are in effect, the Secretary must disapprove a new program if the Director determines that the program would risk significant deterioration of the financial condition of Fannie Mae. The Secretary has adopted regulations related to the program approval requirement. Fannie Mae cannot issue new securities or banking instruments without government approval and it is subject to lawsuits over its corporate practices, just as any other corporation.

Fannie Mae is exempt from all taxation by any state or by any county, municipality, or local taxing authority except for real property taxes. Fannie Mae is not exempt from payment of federal corporate income taxes. Also, Fannie Mae may conduct its business without regard to any qualifications or similar statute in any state of the United States or the District of Columbia.

Thirteen members of Fannie Mae's eighteen-member Board of Directors are elected by the holders of the Corporation's common stock, and the remaining five members are appointed by the President of the United States. The appointed directors must include one person from the home building industry, one person from the mortgage lending industry, and one person from the real estate industry. Under the 1992 Act, one appointed director also must be from an organization that has represented consumer or community interests for not less than two years or a person who has demonstrated a career commitment to the provision of housing for low-income households. Any member of the Board of Directors that is appointed by the President of the United States may be removed by the President for good cause.

Fannie Mae has an Employee Stock Ownership Plan (ESOP) for qualified employees. Fannie Mae may contribute to the ESOP an amount based on defined earnings goals, not to exceed 4 percent of the aggregate base salary for all participants. The contribution is made in the subsequent year either in shares of Fannie Mae common stock or in cash that is used to purchase such stock.

3.5. Private/Public Consortia

A consortium is a legal entity, member-based, not-for-profit organization serving its members and the public (community) for some stated purpose. The members typically share costs, common interests and capabilities. Appropriate examples are the Association of Universities for Research in Astronomy (AURA) and The Universities Space Research Association. These consortia have competed for specific NASA opportunities, particularly, in the development, operation, and administration of NASA Science Institutes. They typically become involved through a procurement contract involving the normal procurement and regulatory constraints.

3.5.1. Universities Space Research Association (USRA)

USRA was incorporated 30 years ago in the District of Columbia as a private nonprofit corporation under the auspices of the National Academy of Sciences. Institutional membership in the Association has grown from 49 colleges and universities when it was founded, to 82 in 1999. All member institutions have graduate programs

[10] The government oversight of the company is not inappropriate, if it were unregulated, it would probably be subject to

in space sciences or aerospace engineering. Besides 77 member institutions in the United States, there are two member institutions in Canada, one in England, and 2 in Israel. USRA provides a mechanism through which universities can cooperate effectively with one another, with the government, and with other organizations to further space science and technology and promote education in these areas. Its mission is carried out through the institutes, centers, divisions, and programs that it administers. A unique feature of USRA is its system of Science Councils, which are standing panels of scientific experts who provide program guidance in specific areas of research. Most of USRA's activities are funded by grants and traditional procurement contracts from the National Aeronautics and Space Administration.

USRA operates and administers the:

(a) Lunar & Planetary Institute, founded by the National Academy of Sciences to manage research access preeminence in planetary and solar system science, shares the facilities of the USRA Center for Advanced Space Studies in Houston, Texas, with the Divisions of Space Life Sciences and Educational Programs.

(b) Institute for Computer Applications in Science and Engineering (ICASE) at the NASA Langley Research Center,

(c) Research Institute for Advanced Computer Science (RIACS) at the NASA Ames Research Center

(d) Center of Excellence in Space Data and Information Sciences (CESDIS) at the NASA Goddard Space Flight Center

(e) NASA Institute for Advanced Concepts (NIAC).

Because USRA member organizations cover a broad range of science disciplines including aerospace engineering, it is not surprising that it has been used by NASA to establish a variety of discipline "Centers" (equivalent to Institutes) at nearly all NASA Centers. Its responsibility has even extended to being selected (competitively) by Ames Research Center as the prime contractor with extensive management responsibilities for the SOFIA project. As a consortia/association, it can call upon a wide range of intellectual talent and adapt as the mission changes in emphasis and has collaborated or served as the lead with government, educational, and commercial entities. Although USRA members are an excellent source of scientific guidance, they provide no capital investment; NASA provides the bulk of the funding. It is encumbered by the usual regulations associated with accepting NASA funds. Although it functions like a typical commercial contractor (for SOFIA) it has no experience in commercial development and its technology expertise is tied to space science (and computer science). It is difficult to locate a consortium that addresses both commercial development and science.

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antitrust and monopolization charges. Fannie Mae did over $1 Trillion in business in 1998.

3.5.2. Association of Universities for Research in Astronomy (AURA)

AURA is a non-profit corporation chartered under the laws of the State of Arizona, was formed in 1957. It is a consortium of educational and other non-profit institutions that operates world-class astronomical observatories that they term “centers”. The consortium is comprised of 29 U.S. institutions and 5 international affiliates. As a university governed management group, AURA has been responsible for the operation of the Space Telescope Science Institute (STScI), instituted in 1981, and several other astronomical observatories worldwide. These include the National Optical Astronomy Observatories (NOAO), located in Tucson, Arizona, which is comprised of the Kitt Peak National Observatory in Arizona; Cerro Tololo Inter-American Observatory in Chile; and the National Solar Observatory at Sacramento Peak.

3.6. Cooperatives and Associations

A Cooperative is an enterprise or organization that is owned by and operated for the benefit of those using its services. A cooperative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise. A Cooperative is normally used in an existing competitive market.

3.6.1. INTELSAT

Although the most familiar cooperatives are those associated with real estate and agriculture, INTELSAT, which has some analogous functionality and requirements as the ISS NGO, is an international cooperative that is partially owned by US based COMSAT, which is also the largest individual shareholder. INTELSAT operates on a commercial basis as a cost-sharing cooperative with the long-term objective of providing services at prices that meet its revenue requirements. Each shareholder contributes to INTELSAT and receives capital repayments and compensation for the use of capital in proportion to its investment share. INTELSAT has had striking success in achieving international cooperation among its 142 member based countries. It does allow its members to create and use competing entities.

Because it is a non-profit, it is tax exempt, although it does have the same reporting requirements. INTELSAT can rewrite its agreements and make amendments to its charter in ways that corporations sometimes may not achieve. Congress does not bind INTELSAT; the members do. However, the restrictions of international law do come into play. Non members can also access INTELSAT service, thus not limiting its market potential or, conversely, implying a monopolistic control. INTELSAT achieved more privatization by spinning off a fully private venture, incorporating it in the Netherlands, and giving it corporate assets (6 satellites) to invest in the market potential of regional customer oriented video and multimedia application. INTELSAT owns 10 percent through an independent trust arrangement.

Some disadvantages include restrictions on INTELSAT's ability to become a privatized and commercialized entity, which can only come about through international agreement. In addition, INTELSAT is not a monopoly and its competitive position is eroding. To address this, the INTELSAT Signatories and Management must agree on the best way to restructure while guaranteeing that they can meet the needs of those countries that are still dependent upon the INTELSAT system. In order to privatize, INTELSAT needs for the US and its member countries to not only adhere to international agreements, but also encourage the privatization, and apply regulatory authority uniformly.

3.6.2. Associations

An Association is a group of persons who share common interests or a common purpose and who are organized with varying degrees of formality. An example of an Association is the nonprofit American Institute of Aeronautics and Astronautics (AIAA) is the principal society and voice serving the aerospace profession. Its primary purpose is to advance the arts, sciences, and technology of aeronautics and astronautics and to foster and promote the professionalism of those engaged in these pursuits. Although founded and based in the United States, AIAA is a global organization with nearly 30,000 individual professional members, over 50 corporate members, thousands of customers worldwide, and an active international outreach.

Independent non-profit or association examples may include Aerospace Corporation (an independent non-profit originally created by the Secretary of the Air Force) or Mitre, an independent non-profit that operates primarily defense related Federally Funded Research and Development Centers (FFRDC). Since most associations are focussed groups of professionals, and normally not involved in operational activities, they are not seriously considered in this study.

3.7. NASA Science Institutes and Commercial Space Centers

3.7.1. Science Institutes

A NASA Science Institute[11] is defined as:

> "A non-Federal entity established to accomplish an ongoing research program; An organization devoted to research, the development and transfer of technology, and the provision of services to the

[11] NASA Science Institutes Plan, A Report of the NASA Science Institutes Team, Final Publication (Incorporating Public Comments And Revisions), National Aeronautics And Space Administration Washington, D.C., February 1996

scientific community, and the public; and, An organization responsible for facilitating scientific and industrial community access to NASA's space and ground-based assets."

The procedures and guidelines for establishing NASA Science Institute are detailed in "Establishing Science and Research Institutes", NPG: 5000.1, Code H, April 26, 1999. In general:

- Institutes will be chartered and directly funded at the direction of the NASA Enterprises.
- NASA Centers will provide services and support to the Institutes. Any core function (including related science) remaining at a host Center that falls within the mission area of an Institute will be funded through the Institute.
- The NASA Chief Scientist will be responsible for coordinating science community involvement in the formulation of Institute plans and continually assessing the quality of the science at each Institute, including any associated NASA component.

However, the definition for an Institute as proposed in the Zero Base Review was modified to read:

- A non-Federal entity established to accomplish an ongoing research program;
- An organization devoted to research, the development and/or transfer of technology, and the provision of services to the scientific community and the public; and,
- An organization responsible for facilitating scientific and industrial community access to NASA's space and ground-based assets.

An Institute is an independent entity with the ability to enter into collaboration with NASA. The form of this collaboration and mode of operation may vary for each of the different Institutes proposed. While Institutes may engage in significant collaborations with NASA Centers, central to each of these arrangements is the existence of a legal entity separable from NASA.

It is expected that Institutes will be operated by universities, consortia or other non-profit organizations in partnership with for-profit industry as appropriate. It is not expected that a single model for an Institute can deal with the wide range of missions and scopes identified for the Institutes under consideration. However, Institutes will have a number of common characteristics.

External Leadership - Each Institute will have identifiable intellectual leadership outside of NASA. Institute Directors will not be NASA employees. Similarly, Institute Boards of Directors will not include NASA employees. Institutes will be established to allow for shared ownership and the more substantive involvement of communities external to NASA. Institutes will foster cooperation, not competition, among the government, academic, and industry sectors.

Corporate Identity and Affiliation with NASA - A clear identity with NASA and a part of its mission is an essential common characteristic for each Institute proposed. This corporate identity is likely to be

established through the Agency's long-term funding commitments to the Institute. It is reasonable to expect that Institutes may wish to acknowledge NASA's sponsorship and support in their institutional advertising, annual reports, press release credits, and other documents for public dissemination.

Competitive Selection and Peer Review - All work assigned to Institutes should be the result of a competitive selection process. This competitive process may be part of the initial selection process or subsequent selections for scientific research grants or individual projects. In the case of scientific research, all selections should result from a process that conforms to standard policies including peer review as appropriate.

Inclusion of Research, Technology, and Service Components - Each Institute will be responsible for: conducting and enabling peer reviewed research for the development of new scientific knowledge and understanding of nature; creating, developing, and/or transferring new technology; and providing value-added services to its external customers.

Degree of Independence - As mission organizations, Institutes will be expected to behave proactively, exercising the necessary degree of entrepreneurialship, autonomy and judgment required to achieve their stated goals and objectives while contributing to NASA's mission. As independent entities, Institutes may also obtain support from other funding sources, open new lines of business, and perform work for others subject to a determination by their Board of Directors that such work is not inconsistent with the Institute's overall mission.

Off-Site Business Office - Science Institutes will have a physical presence and will not be merely “virtual” organizations. Consistent with an Institute's identity as an independent entity, separate and easy access should be provided for the external science community to make use of Institute services and facilities. In order to facilitate this non-government business, at a minimum, each Institute established should maintain a business office and “front-door” organization off-site from any affiliated NASA Center.

IPA Eligible - It will be desirable for an Institute to have as its operator or sponsor an organization which is able to exercise the flexible employment arrangements provided under the terms of Intergovernmental Personnel Act or IPAs. The IPA program provides a proven means for exchanging critical ideas, knowledge, skills, and human resources between the Federal government and other sectors. (Examples of IPA eligible organizations include state and local governments, institutions of higher education, and some non-profit organizations.)

NASA Science Institutes that are primarily operated through a Cooperative Agreement with NASA include:

- Global Hydrology and Climate Center (MSFC)
- Astromaterials Institute (JSC)
- Goddard Institute for Space Studies (GISS)
- Astrobiology Institute (ARC)
- Microgravity Institute [Fluid and Combustion] (LERC)

Proposed Institutes:

- Microgravity Institute [Materials Sciences and Biotechnology] (MSFC)
- Space Science Institute (MSFC)
- Atmospheric Sciences Institute (LARC)
- Space Power and On-Board Propulsion Institute (LERC)
- National Space Science Data Center (GSFC)
- Goddard Earth Sciences and Technology Center (New, CAN is in RFP stage)

A special Institute arrangement is used to procure the services through Cal Tech at the Jet Propulsion Laboratory under direct contract to NASA.

Institutes require stable funding from NASA to support core service and research functions. While in some ways they have the broadest charter of any NASA entity, they may argue that they cannot always fully conduct a full range of activities due to the limited budget they are allocated. A second disadvantage is that a NASA Institute remains a NASA entity, usually lead by a NASA civil servant or appointee, and has therefore limited flexibility and freedom from bureaucratic constraints. It is difficult for a NASA Institute to act in a promotional mode to achieve outside funding, although not expressly prohibited.

3.7.2. Commercial Space Centers

NASA's commercial development research program, within the Office of Life and Microgravity Sciences and Applications, is carried out primarily through Commercial Space Centers (CSC). The CSC's are consortia of industry, government and academia that conduct space related research with commercial potential. The Centers are located at University or non-profit organizations with responsibility for selection of academic, government, and industrial affiliates, project formulation, and adherence with NASA requirements. All commercial development research projects compete for flight and space aboard the Space Station at the product/project level, as distinguished from the apparatus or program level. Evaluations are conducted by the appropriate NASA field center. Although the consortia structure of CSC's lends itself to accomplishing the

functional tasks of the NGO, their scope and affiliation would need to be greatly expanded in order to meet the rationale for an NGO. Several examples of CSC's are described below for reference.

3.7.2.1. Texas A&M University — Commercial Space Center for Engineering

This CSC, formally established by the Texas A&M University System Board of Regents, is dedicated to working with industry to generate engineering research and technology development projects to be conducted on the space station. As one of NASA's Commercial Space Centers, it along with its business partners merit preferred and low-cost access to space. It represents a one-stop-shop for spacecraft technology developers, providing expert technical support, simplified ISS integration, and business planning services.

3.7.2.2. BioServe Space Technologies

Bioserve Space Technologies is located at the University of Colorado in Boulder. The Center embodies affiliates from the commercial, academic, government and non-profit foundation sectors. BioServe concentrates its efforts in five areas. In the area of bioprocessing/bioproduct development, microgravity is used to foster the commercial development of new bioproducts for use in the human body and unique, commercially important bioprocessing techniques. Another area, physiological modeling in space, uses microgravity to explore changes that occur in living systems. Special emphasis is placed on using space as a unique laboratory to address terrestrial health concerns in ways that are not possible on Earth, and to address health issues that will be of concern to living organisms exposed to microgravity for long duration. Biomolecular electronics, the fourth area of research, uses microgravity to develop new "biocybernetic" materials for use in future computer systems. The fifth area, called enabling device capability, focuses on developing a suite of generic, flight-qualified and flight-proven devices that address the needs of a wide spectrum of life sciences investigators.

4. Objectives and Requirements

Section 2.2 introduced the rationale for adopting an NGO form for the ISS utilization management entity. Section 3 discussed various types of management structures. In this section, the elements of the rationale are examined, as well as other relevant organization requirements, as related to these various management structures in order to predicate metrics which will be useful in comparing them. This analysis will become the basis for establishing strengths and weaknesses for each option; these will be discussed in Section 5.

4.1. Examination of the Rationale

4.1.1. Minimizing Regulations

Federal regulations affect, in particular, contracting, purchasing, property management, human resources, marketing and accounting. They increase the overhead cost of an operation (of the order of several percent) due to the increased staffing levels required to enforce them. More importantly, they introduce delays in the business operation due to increased number of hand-offs or interfaces. These delays translate into schedule impacts that do affect the overall cost. The most common regulations arising with the acceptance and use of federal funds are the Federal Acquisition Regulations (FAR). A listing of the applicable FAR's as a function of the procurement value and type are given as Appendices B and C. For high dollar value procurements, time-consuming certifications introduce delays in the procurement and constraints limit flexibility. A recent development is the establishment of independent and agency-unique acquisition systems that ostensibly are set up to avoid the burdensome constraints of the FAR. The first example of this is the Federal Aviation Administration's Acquisition Management System. Table 4-1 lists the key code requirements for each of the NGO types along with those for a GO, for comparison purposes.

Table 4-1: Code Applicability

Private Corporation:
- State Corporation Laws
- Uniform Commercial Code
- Generally Accepted Accounting Principles
- Commerce and Trade Procedures (15 U.S.C.)

Independent Consortia or Institute:
- State Corporation Laws
- Generally Accepted Accounting Principles
- Commerce and Trade Procedures (15 U.S.C.)

Association and/or Cooperative:
- State Corporation Laws
- Generally Accepted Accounting Principles
- Commerce and Trade Procedures (15 U.S.C.)

Government Corporation:
- Government Organization and Administrative Procedures (5 U.S.C.)
  - -Less Freedom of Information Act
  - -Less Civil Service Rules regarding pay and tenure
- Government Corporation Control Act (31 U.S.C.)
- Commerce and Trade Procedures (15 U.S.C.)

State Agency:
- Code of applicable state, e.g., Maryland (COMAR)
- Code of Federal Regulations

NASA Institute:
- Public Contracts Procedures (41 U.S.C.)
  - Cost Accounting Standards
  - Federal Acquisition Regulations
  - NASA FAR Supplement
- Public Health and Welfare (42 U.S.C.)

NASA Division:
- US Code applicable to Federal Agencies

Government Organization and Administrative Procedures (5 U.S.C.)
- Freedom of Information Act
- Privacy Act
- Sunshine Act
- Inspector General Act

Money and Finance Procedures (31 U.S.C.)

Public Contracts Procedures (41 U.S.C.)
- Cost Accounting Standards
- Federal Acquisition Regulations
- NASA FAR Supplement

Public Health and Welfare (42 U.S.C.)

Applicable code constraints for various Government Corporations have been detailed in a GAO report[12] and will not be repeated here. In that report, one finds that there is flexibility in which Codes apply depending upon the terms in the enabling act. Of particular concern to the commercial user of ISS is the applicability of the FOIA, i.e., the concern for intellectual right protection. For some NGO's that are Government Corporations, a release is invoked from the FOIA based on the concept that data receivership by an NGO is not equivalent to agency information and thus is protected. Congressional approval of the waiver is required. This invocation is most likely applicable to the experiments, technology, and commercial development of ISS general users but must be examined regarding internal IR&D by staff. The detailed exemption granted by NASA regarding FOIA is given in Appendix D.

The following statutes are commonly applicable to NGO's receiving federal funding.

A. Economy Act: 31 USC Section 1535. Provides authority to Federal agencies for requesting and performing interagency reimbursable work. Under this authority, NASA's obligation authority expires when the customer agency's authority expires.

B. Anti-Deficiency Act**:** Title 31, U.S. Code, Sections 1341 and 1517 (principal provisions):
    a) Prohibits any officer or employee from making or authorizing an obligation in excess of the amount in an appropriation or in an amount permitted by agency regulations.
    b) Forbids the involvement of the government in any contract or obligation to pay money in advance of appropriations.
    c) Requires the head of each agency to issue regulations establishing an administrative control system with a dual purpose: first, to keep obligations within the amount of appropriations, and second, to enable the agency to fix responsibility for making obligations in excess of the apportionment.

4.1.2. Management Flexibility

An NGO can be established[13] in response to four different contractual instruments, viz., mandated by state or federal charter (or legislation), an "Other Transaction" (OT), a Cooperative Agreement, or a conventional procurement contract. Each instrument provides a different degree of management flexibility, say, in regard to personnel actions, restructuring to meet changing goals or opportunities, or making business agreements with

[12] " Profiles of Existing Government Corporations". Report to the Ranking Minority member, Subcommittee on Post Office & Civil Service, Committee on Government Affairs, U.S. Senate. U.S. General Accounting Office. B-259476. December 1995.

new affiliates. The financial and management aspects for the charter-based instrument have been described in Section 2 in which Government Corporations were discussed. This section focuses on the three remaining instruments with special attention give to the OT because of its high potential for achieving maximum financial and management flexibility.

4.1.2.1. Other Transactions

Financial flexibility applies both to how the NGO is funded as well as to what authority it has for distributing funds. A key issue is securing Government funding or subsidies without being encumbered by government-imposed accounting and procurement regulations regarding their use. One approach to accomplish this has been the use of contractual authority loosely defined in the 1958 Space Act, 42 U.S.C. § 2473 (c) (5), as "other transactions", a term coined by NASA General Counsel Paul Dembling.

DEFINITION OF TERMS

Procurement contracts are used when the principal purpose of the instrument is to acquire property or services for the direct benefit or use of the United States Government.

Assistance Agreements include grants and cooperative agreements, the principal purpose of which is to transfer something of value to the recipient in order to carry out the public purpose instead of acquiring property or services for the direct benefit or use of the United States Government.

Cooperative Agreements are used when the expected involvement of the agency is substantial. *Grants* are used when the expected agency involvement is essentially administrative.

4.1.2.2. NASA's Use of Other Transactions

Within NASA, Other Transaction authority has been used numerous times in the form of Memoranda of Understanding, Letter Agreements, and Nondisclosure Agreements - generically known as Space Act Agreements. An important variant is the Joint Endeavor Agreement (JEA) which has permitted commercial entities to use NASA resources (STS, laboratories, zero-g facilities, etc.) usually in exchange for NASA access to the commercial equipment. A more ambitious agreement was struck with the Orbital Sciences Corp. (through a Memorandum Of Understanding) to develop a transfer vehicle for lifting payloads into

[13] Throughout this study it is assumed that no single existing organizational entity will be adequate for the scope of the ISS utilization management particularly if both scientific and commercial interests are to be served. The formation of some hybrid management-operational entity is therefore presumed.

geosynchronous orbits from the Shuttle. In general, these OT's have limited applicability and narrow scope and relate to working relationships, allocation of responsibilities (and liability), and transfer of technologies.

4.1.2.3. DOD's Use of Other Transactions

The Department of Defense (DoD) formalized the use of Other Transactions as it began to privatize certain laboratories originally under its jurisdiction beginning in 1989. DoD's use is primarily throughout DARPA, its R&D organization. It is worth noting that the simplicity of DARPA's organization and relatively autonomous culture enables some of these freedoms. Hindered in finding innovative contractors with promising new technology that were willing to work under government procurement, DARPA concluded it needed flexibility in its approach to support advanced R&D. DARPA turned to NASA for inspiration. By authorizing DoD to use Other Transactions to fund research and development activities, Congress effectively exempted such research activities from the requirements of the Chiles Act. Agencies were given independent authority to enter into binding agreements that might include significant funding for the acquisition of goods or services, but were not subject to the formalities and cumbersome rules applicable by statute to procurement contracts. It is important to note that with its granting of flexibility, the Congress requires DoD to provide an annual report on the use of OT's. In addition, the enabling legislation applicable to the DoD involves an expiration clause in its OT arrangements.

Other Transactions are typically defined by what they are **not**. For example, the DoD enabling regulations call for DoD's use of the OT authority "only when the use of standard contracts or grants is not feasible or appropriate." DARPA followed, stating that an OT is "not a standard procurement contract, grant or cooperative agreement." Because of this definition, OT's are **not** subject to government procurement regulations or statutes. However, OT's are not exempt from all laws and regulations; they are subject to statutes and regulations that govern non-procurement activities. Certain statutes applicable to procurement contracts, cooperative agreements and grants may not necessarily apply to OT's. The statutes[14] applicable to procurement actions involving OT's are listed in Table 4-2.

4.1.2.4. Characteristics of OT's

The three categories for OT's are Research, Prototypes and other types of arrangements. The policy has been to use OT's to carry out research projects not appropriate or feasible by standard grants or cooperative agreements. Four factors that must be considered before issuance are the nature of the project, the type of

[14] "The Applicability of Certain Procurement-Related Statutes to DoD 'Other Transactions', a Project of the ad hoc Working Group on 'Other Transactions', Section of Public Contract Law, American Bar Association, Feb 10, 1999.

recipient, the recipient's agreement to cost share, and the government's official involvement. It should be noted that OT's attract firms that have not traditionally done business with the government due to the desire to avoid burdensome financial reporting, procurement, and intellectual property arrangements. Characteristics of OT's are flexibility, teaming of partners, cost sharing, and use of commercial business practices rather than FAR and DoD authorities.

- Flexibility applies in the application of particular statutes. For example, OT's also allow more flexibility in intellectual property arrangements.
- Teaming allows the agency to use consortiums of technology developers with government participants. The ability to freely work together and collocation contribute to OT success.
- Cost sharing reduces government costs and serves as a test of commitment and incentive to avoid waste, thus accomplishing the goals of the unutilized regulations. However, cost sharing is not essential in an OT.
- OT's require trust and flexible commercial-like business practices, and an honest business relationship, and expediency.

Cultural resistance to change is, of course, a barrier to use of OT's, and in DoD, training has been conducted to ease the problem. However, OT's do serve to enhance competitiveness and technical success. Since current legislation related to OT's restrict that instrument's use to R&D (or prototyping), legislative redefinition of OT's may be required in order to accommodate the new functionality associated with privatizing NASA operational functions.

Table 4-2 Applicable Regulations

	STATUTE	A	N/A
1	Competition in Contracting Act		X
2	Contract Disputes Act		X
3	Procurement Protest System		X
4	Extraordinary Contractual Authority And Relief	X	
5	Expenditure of Appropriations, Limitation	X	
6	Kinds of Contracts		X
7	Examination of records of contractor		X
8	Contracts, acquisition, construction, or furnishing of test facilities and equipment		X
9	Contracts; indemnification provisions		X
10	Prohibition against doing business with certain offerors		X
11	Major Weapon Systems: Contractor Guarantees		X
12	Prohibition on persons convicted of defense Contract related felonies and related criminal penalty as defense contractors		
13	Contractor employees; protection from reprisal for disclosure of certain information		X
14	Limitation on the use of appropriated funds to influence certain Federal contracting and financial transactions		X
15	Anti-Kickback Act		X
16	Procurement Integrity Act		X
17	Service Contract Act	X	
18	Walsh-Healy Act		X
19	Fair Labor Standards Act	X	
20	Drug-Free Workplace Act		X
21	Buy American Act		X
22	Tucker Act	X	
23	Bayh-Dole Act		X
24	Technical Data provisions applicable to DoD		X
25	Trade Secrets Act	X	
26	Freedom of Information Act	X	
27	Judgements, awards and compromise settlements	X	
28	Limitations on e pending and obligating amounts	X	
29	Administrative Remedies for False Claims and Statements	X	
30	Truth in Negotiations Act		X
31	Cost Accounting Standards		X
32	Cost Principles		X

4.1.2.5. Cooperative Agreement

An important contractual instrument, other than the common procurement contract, that can be used to define the relationship between NASA and the NGO is the Cooperative Agreement. As defined by 31 U.S.C. 6305, cooperative agreements are financial assistance instruments used to stimulate or support activities for authorized purposes and in which the Government participates substantially in the performance of the effort. There are two regulatory statutes: one for commercial entities and one for universities and non-profit organizations covered by 14 CFR Part 1260.

Cooperative agreements are ordinarily entered into with commercial firms to:

a) Support research and development

b) Provide technology transfer from the Government to the recipient

c) Develop a capability among U.S. firms to potentially enhance U.S. competitiveness.

In general, competitive procedures to award a cooperative agreement are preferred. Unsolicited proposals may be made but must evidence a unique and innovative idea or approach that is not the subject of a current or anticipated solicitation. A substantial resource contribution on the part of the recipient is required (at least 50% of the total resources required to accomplish the cooperative agreement). Less than 50% may be considered but must be warranted. If NASA resource contribution is $5 million or more, high level Government approval is required. Recipients shall not be paid a profit under cooperative agreements. Subcontractors however, may earn profit. The recipients cost share may be allocated as part of its IR&D program in accordance with a class deviation pursuant to 48 CFR (NFS) 1831.205-18. The Government's resource contribution may include non-cash items such as personnel, equipment, facilities, etc. In the case of the NGO, the in-kind contribution by NASA could be the exclusive allocation rights, or some fraction thereof, to ISS utilization.

Using consortia as recipients for cooperative agreements is encouraged. These may be comprised of Government organizations and commercial firms, which perform complementary functions. Use of educational institutions, small and small disadvantaged business is also valuable in ensuring the results of the consortia activities are widely disseminated. Participation by foreign firms is not precluded if the evaluation criteria are satisfied.

Title to inventions developed under the Cooperative Agreement is limited by Space Act of 1958 (42 U.S.C. 2457). NASA uses its best efforts to grant the recipient first option to acquire inventions. It should be noted that invention and patent rights are governed by the Space Act Agreement, which can be more flexible in the area of data rights. For large businesses, the Government is awarded title initially. The recipient has 30 days after discovery to request a waiver under patent regulations. Any recipient-developed invention to be commercially

licensed will be royalty bearing to the individual inventor (ex. Government employee-inventor). Since a Cooperative Agreement is governed by federal regulations, the recipient is offered various protections not otherwise available (ex. Cross waiver of liability clauses). License regulations are covered by the Federal Technology Transfer Act.

4.1.2.6. Procurement Contract

A procurement contract is a legal instrument reflecting a relationship between the government and a recipient where the principal purpose of the relationship is to acquire property or services for the direct benefit or use of the government (31 USC 6303). In the context of ISS utilization management, the simple procurement of these management services through a procurement contract could apply to a) commercial corporations and b) institutes such as the HST Science Institute, both not involving cost sharing. The use of a procurement contract is the traditional approach which entails the full gamut of regulations and constraints and will therefore not be discussed further.

4.1.3. Financial Flexibility

Financial flexibility derives from both a reduction in restrictive regulations and an increase in the possible sources of operational (and grant) funding. Table 4-3 lists representative funding sources for each of the NGO approaches.

Table 4-3 Sources of Funding

Funding Source	Gov Corp	GSE	State Agency	Coop	Consortium	NASA Institute	Cmmrcl Corp
User Fees	•		•	•	•	?	•
Government Grants	•	•	•		•	•	•
Private Endowments			•	?	•	•	
Royalties	•	•	•	•	•	•	•
Dues				•			
Taxes	•		•			Indirect	
Stock	•	•		•			•
Bonds	•	•	•		?		•

User fees could be used to recover some fraction of marginal operating costs for all options except the NASA Institute; amortizing development costs of the entire infrastructure for any option is unlikely due to the high cost of ISS and STS. These fees may be direct subsidies or grants from NASA or be charges levied against users

according to a service schedule not unlike that being used in the CSOC approach for mission operations. User's funds could be derived from grants made by NASA directly to the scientist or a company's IR&D pool in the case of commercial users. A special form of the fee could be a percentage charged against the profit for the direct and continuing commercial use of the ISS such as for advertising, souvenirs or other space-items. If the NGO were to be franchised for performing all, or a major portion of, experiment or payload integration testing, then this could become a significant source of funds to cover recurring costs and, possibly, create profit. The additional non-recurring cost for establishing this capability within the NGO would be offset by the long-term cost savings from efficiencies of using a single entity with accrued experience.

The majority of the management options discussed in this study are non-profit but this in itself does not allow tax-deductible contributions or endowment as a viable funding source. However, with appropriate enabling legislation, an associated NGO Foundation could be established having a 501 C (3) status with the objective of funding beneficial experiments while affording donors tax advantages.

A potentially significant funding source for all options are royalties garnered from the long-term commercial exploitation of products resulting from technology developed using the ISS. The terms for royalties would be established as part of either limited partnerships or user agreements made in advance of providing service to the user. They would not be applicable to government users. Royalties could serve as a source for grants or venture capital as well as defraying recurring operational expenses.

Dues are appropriate in the consortia or association option as a standardized means to subsidize the operation of the NGO. In this option, the signatory members are allocated some predefined access rights and service support according to terms established in the charter of the NGO. Non-signatory users can "purchase" temporary access and support services based on a "public" fee structure. As the ISS develops into a mature facility and risk of utilization declines, access to this limited resource will appreciate and so will the price of the access or tenancy rights. This appreciation is analogous to a capital gain in the commercial market, and thus provides more incentive for commercial firms to enter the initial endeavor.

Issuing either debt or equity instruments requires a credible return, which, in turn depends on the "profitability" of the NGO-ISS. By its nature as a facilitator providing a standardized service for a resource-limited facility, the NGO deals with a small customer base and has limited growth capability in terms of new services or features. It therefore offers limited return on investment, excluding the royalty potential, and any public or private investment would be more altruistic than profit seeking. As royalties accrue, this situation could change with the emphasis being in equity investment and the NGO assuming the role of a venture banker.

In any of the options, NASA would presumably enjoy major tenancy for ISS utilization, at least in the initial period, and thus provide a sizable subsidy for NGO operational funding directly or indirectly through grants to users. It remains to be seen whether similar tenants would be created by the initial user successes wherein blocks of ISS time would be procured for resale (at some profit to the original owner) or corporate use. Presumably some limitation would be imposed on member ownership – not unlike that for COMSAT. This approach to funding is most consistent with either the Cooperative Association or Consortium forms of NGO. In order to foster broad science and commercial application of the ISS, these members would need to be term limited.

4.1.4. Cost Reduction

Before attempting to impose solutions for the purpose of minimizing cost, it is first useful to establish root causes of excessive cost. These causes, once identified, then drive implementation requirements or metrics and an effective, efficient solution. This strategy applies equally well to either a GO or NGO implementation approach. It is assumed that there is some baseline cost related to the technical aspects which assures engineering worthiness and the desired performance of any proposed experiment. Additional costs accrue due to the business and/or management environment in which the experiment is acquired and utilized. Some are related to physical interface issues but most are due to socio-political-economic pressures. An informal cause-effect analysis for the issue of increased cost lead to the following root causes: risk of failure, concern for asset jeopardy, and overhead. In addition, a business "cost" was identified associated with schedule guarantee as well as a fifth cause, motivation, which is associated with the institution involved. These five cost drivers are discussed below.

4.1.4.1. Risk of failure

In the past, minimizing failure has been necessary because of the paucity of space opportunities and the political significance of being successful in space. Traditionally, it entails additional experiment analysis; testing and demonstration; redundant design with failover capabilities; frequent management review; and extensive documentation. All these requirements increase the overall price of the experiment without enhancing the science return. The ISS affords extended stays, possibility of experiment repair and, in the case of an experiment failure, reasonably easy repeat opportunity. Thus, independently of the management structure employed, the operational environment of the ISS already mitigates this risk factor. The degree of risk[15] to be adopted becomes more an experimenter trade decision weighing against the urgency of obtaining results versus the added cost of "overdesign". In the event that the management entity also conducts in-house

[15] It should be noted that schedule uncertainties and immature interfaces will keep this cost high initially.

experiments onboard the ISS, the degree of acceptable risk may be lower, and the cost therefore greater, in order to preserve its management and operator credibility.

4.1.4.2. Asset Jeopardy

Additional requirements are imposed on the experiment development process and design related to its failure modes and their potential for injury to either the delivery system (STS) or the space facility (ISS) and its operators (astronauts). The ISS, along with its crew, is an expensive asset which must be safeguarded. Users, employing the NGO as their agent, will be required to meet externally generated safety requirements which are significant cost driver. It is estimated that an attached Shuttle payload requiring little or no astronaut interaction involves a cost premium of 5%. This can grow to 20% for one requiring intensive interaction because of the more complex interface, safety, crew training, etc. As long as the user must interface through the NGO with government controlled assets, the STS and ISS; the added expense of "man-rating" of experiments to meet the safety requirement is unavoidable. Eliminating the interface by assigning responsibility for the ISS to the NGO would tend to reduce this cost but it can be mitigated in other ways as well. Using the Shuttle attached payload program as an example, a gradual relaxation of requirements with the consequent reduction in this expense can occur with a growing experiential base. Thus costs could be reduced by using the most experienced experiment integrator who provides consultation at all phases of experiment development, whether a GO or NGO, and by providing the crew for operating the experiment. This does argue that independently of the type of management structure, long-term continuity is important in order to build payload operator/integrator confidence and accumulate experience.

4.1.4.3. Overhead

Overhead is here defined as charges levied against the experiment by the NGO (or GO) to cover its "expense" of doing business but not necessarily in direct support of the experiment. These costs appear to the user as increased usage charges or, for a zero-sum federally funded NGO or a GO, reduced available experiment funding. The first, and most obvious, step is to minimize staffing and procedures related to unnecessary regulations. A second is to utilize existing facilities, if possible, rather than creating special ones, particularly for simulations, testing and integration. A third step is to constrain the management entity by terms in its charter to focus all of its activities to be in direct support of experiments and their operation. The exception is when these activities result in a net financial return by promoting increased commercial usage of the ISS.

4.1.4.4. Schedule Guarantee

A serious business issue can arise if the "owner" of the asset (ISS) is free to alter mission priorities and schedules for its own purposes independently of the utilization plan. This conflict could occur if the ISS is a shared facility with some functions or activities conducted outside the scope of the NGO-managed utilization.

Particularly for commercial endeavors, the decision to undertake a development project depends on the timeliness (or unpredictability) of bringing the product through its development phase to market. The inability to obtain schedule assurance can dissuade participation. One can consider delay as a "cost" that affects the profitability of the development and, consequently, needs to be minimized. One solution to this issue is for the NGO to have prenegotiated guaranteed access rights independently of other ISS activities, excluding emergencies, or to be given control of all activities onboard the ISS. Furthermore, in order to reduce the perceived schedule risk, the NGO could provide users with indemnification for lost access albeit at the expense of increased overhead cost for the sake of making the ISS more commercially attractive.

4.1.4.5. Motivation

The last consideration which applies to cost reduction is motivation. In some management options there may not be incentive to control or reduce cost. Government organizations are often motivated to maintain spending levels rather than reducing them in order to protect future year budgets or to provide contingency resources. But for the most part, GC's and the more public forms of NGO's are exempt from use-or-lose funding rules. They can consequently be motivated to reduce costs and use the recovered funds for the purposes of reinvestment to expand the scope of service or reduce user fees. Freedom from use-or-lose funding regulation is therefore an important feature for an NGO. A for-profit variant of an NGO, as with any commercial firm, could be expected to routinely address cost reduction (and increased quality) in order to maximize profit. Mixed ownership GC's supply motivation through equity asset appreciation. Cost incentive, performance based procurement contracts can provide motivation if cost control is a metric (although the sponsoring Agency may be unmotivated to use this). In any option, the approach benefits from having a "reward" for any cost savings.

4.1.5. Liability and Indemnification

4.1.5.1. Legislative Basis

This section highlights the complexities associated with liability and indemnification which could or will arise in the use of an independent or privatized entity managing ISS utilization.

Any private or commercial endeavor involving the use of space requires arrangements regarding liability in regard to the home nation and among nations (and multi-national organizations). The former is normally accomplished using some form of an agreement while the latter is addressed by International treaties and space law[16], specifically the UN Outer Space Treaty of 1967. Under the Space Act, 42 USC Sec 2473, the Administration was authorized to act on claims for $25,000 or less for bodily injury, death, or damage to or loss

[16] Some material was excerpted from American Space Law, 2nd Edition, N.C. Goldman. 1996.

of real or personal property resulting from the conduct of the Administration's functions. Larger claims require Congressional approval.

In order to foster commercial participation in space programs, NASA has been authorized by Congress to extend cross-waiver of liability to its contractor and subcontractors. This waiver applies to 1st and 2nd party liability, i.e., each party to the agreement bears his own risk and not the total risk of the venture. Cross-waivers apply to the parties of the agreement only. Note that no waiver denies the right of an individual, i.e., a 3rd party, to make a claim. Each entity must agree to these terms contractually. In regard to Space Station activities, NASA contractors and subcontractors are protected, excluding injury or death, but in the exercise of this authority, Congress requires NASA to establish safety plans and reviews to ensure, to the maximum extent possible, that payloads pose no safety risks for the ISS. This protection has been extended into protected space operations, a term which broadly covers all phases of an experiment except those processes for further product development following Earth return, as of July 1994. An important exception are claims related to intellectual property.

Indemnification regarding injury or property loss claims is a separate but important issue that relates to 3rd party type liabilities. These can arise in the life cycle from experiment development, through integration and test, to operation aboard the ISS. Originally, to promote space activities with a reasonable risk framework, the NASA Space Act, Section 308 provided for government assumption of 3rd party liability for claims in excess of commercially available insurance limits. As amended later, Sec. 308 requires Shuttle users to purchase 3rd party liability insurance up to $500M with NASA assuming responsibility for claims in excess of this. NASA, in October 1997 and then in March 1998, requested a further extension of the indemnification to the newer arrangements (Other Transactions, cf. Section 3.1.2.1) being used by NASA in partnership with industry. It should be noted that this extension request is explicitly focussed on domestic R&D programs and excludes international activities such as joint programs involving the ISS.

4.1.5.2. Liability Implications for the NGO

Liability considerations depend on the functional responsibility allocated to the NGO. In the following, the functionality listed in Appendix A (Work Breakdown Structure) is assumed. Four features of the NGO make it distinctly different from a traditional commercial contractor in regard to the current liability provisions discussed above.

The NGO could:

- Be created using a non-procurement contract and is relatively independent of NASA

- Be involved not only in facilitating R&D but also commercial enterprises (from which it may derive financial benefits),
- Serve as a participant in the development aspects of payloads and experiments,
- Share authority for ISS utilization with other international agencies and depends upon the NASA controlled STS to accomplish its responsibilities to users.

The use of the Other Transaction[17] authority to establish an NGO would not be covered by the usual government indemnification for tort liability[18] to 3rd parties. Under International Law, both the launch provider and procurer are held liable for damages to a blameless third party. In the context of the NGO, with NASA controlling both the STS and ISS, an independent NGO may be considered the procurer for NASA services and is thus reciprocally liable. In these cases, the NGO cost for liability insurance could be excessive. To overcome this, the NGO will require special dispensation through indemnification provisions in its charter for a Government Corporation or agreement for an OT-acquired entity. Since the marketability of ISS resources is proscribed by the availability of launch resources and the physical growth limitation of the ISS itself, an NGO's revenues are constrained and it would not be capable of bearing the high cost of insurance unless it passes this cost on to the user. If the NGO takes the form of a Government Corporation, it could be considered an entity of the Federal government and, as such, qualify for the general indemnification and liability protection afforded other agencies. This would be valuable if, in the future, the control of the ISS were transferred over to the NGO thereby privatizing the entire space station enterprise.

The Getaway Special (GAS) program requires experimenters to purchase their own insurance (or bear the risk) for space-related accidents because NASA considers itself immune. This and similar programs has resulted in extensive legal packages under the objective of fostering commercial uses of space. For the Rapid Spacecraft Acquisition program at GSFC, NASA assumes no liability until acceptance and requires developers to acquire insurance during the development phase. If the NGO serves to provide integration and test, simulation, and training services to users of the ISS, then it may be considered part of the development process and with that assumed, there is an implied responsibility for liability in the development of the experiment. This, in turn, requires the NGO to participate or acquire directly liability insurance unless specifically waived as part of the contract between NASA and the NGO.

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[17] This matter is discussed by Mr. Rising, Lockheed Martin, in the Hearing on Indemnification & Cross-Waiver Authority before the Subcommittee on Space & Aeronautics of the House Committee on Science, Oct 30, 1999. The discussion focussed on the lack of government indemnification due to the use of a Cooperative Agreement (Other Transaction) for the development of the X-33.

[18] Tort law relates to injury or damage due to negligence not related to breach of contract.

Aside from its participation in experiment development functions, the NGO may be considered at the same time an agent of the user in dealing with NASA regarding accommodations, schedules, and (launch) delivery aspects of the enterprise. In this capacity, the question of indemnification from consequential and collateral damage arises in the handling of the experiment. Terms of agreement with the user, similar to that invoked by commercial suppliers of products, will be needed to waive liability. On the other hand, if the NGO's objective were to "promote" commercial use of the ISS, it would be better served to be able to extend 2nd party liability regarding the services it offers to the user as an agent. In this case, the user would have redress to cover business losses or reduce risk in the planning of a commercial enterprise against denied access to the ISS. Currently, such assurance is not provided except through queuing and bumping provisions stipulated in user agreements regarding the Shuttle.

4.1.5.3. Summary

The nature of the NGO implementation is somewhat different from the majority of the cases addressed by liability legislation since this legislation deals with commercial entities interacting with NASA while the NGO is more the privatization of a traditional NASA function. It will therefore require special legislative considerations and new agreement provisions with users.

5. ANALYSIS

5.1. Implementation Paths

Figure 5-1 summarizes the principal NGO implementation strategies discussed in this study. They are characterized by a) the process or path for establishing the NGO and b) the final form or type of NGO. The paths may involve competitive (Comp) or non-competitive (Non-Comp) acquisition processes. The latter usually involves, additionally, the need for enabling legislation by the Federal or a State government. The three principal contractual instruments, which define the relationship between NASA and the NGO and establish the NGO's responsibilities, are: procurement contracts, cooperative agreement, and Other Transactions Presumably the NGO, regardless of type, would then use conventional procurement instruments to acquire support services and specialized skills. Under certain state statutes, services could be offered as payment for stocks in the NGO enterprise. These NGO contractual activities will not be discussed here but could cover operations personnel, software maintenance, logistics support, engineering analysis, integration and test specialists, etc. The path labeled IA represents the standard NASA procurement approach and is not discussed below; the more flexible quasi-GO approach involving either a procurement contract or a cooperative agreement to form a NASA institute is shown as path IB. It should be noted that only a minor difference exists between the paths designated as IC and II since, in both cases, a form of an OT is used. The main distinction is that by using the enabling legislation to establish the NGO, its charter can be tailored to

meet the international perquisites as well as empowering it to eventual full privatization status with minimal regulatory constraints. In effect, the legislation would prescribe the conditions and manner by which privatization would occur.

The more obvious strengths (S) and weaknesses (W) for each path and NGO option, based on the materials in this study, are discussed below. The path involving NASA using an OT to form a partnership with a consortium was not included because, at the present time, statutes limit the use of this instrument to research or prototyping. Its application to facilitating research is therefore covered as Path II presuming that new legislation will be required for it to be valid. The Path IA is not discussed since that represent the traditional approach for NASA to obtain support for its own purposes.

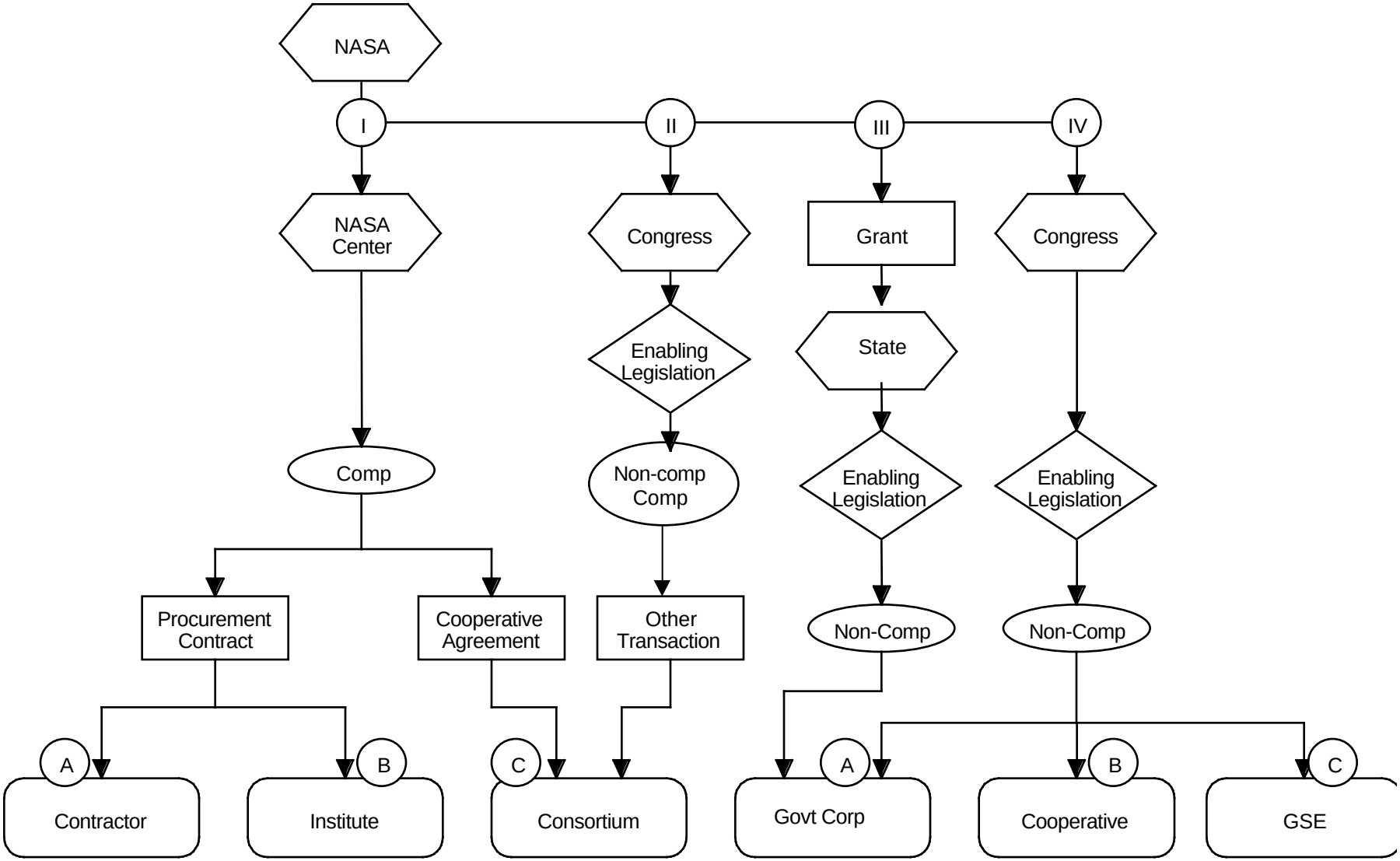

Figure 5-1 Implementation Strategies

5.1.1. Strengths and Weaknesses

Path IB: The responsibility for facilitating ISS utilization is transferred to a special "Institute", which is established through a competitive procurement.

S Highly appropriate for facilitating research with ISS
S Well understood with precedents
S Cross-waiver for liability applies
S Flexible personnel management

W Limited flexibility for acquiring independent funding
W Subject to government regulations, particularly FAR
W Strong NASA oversight and control
W Not consistent with commercial utilization of ISS

Path IC: NASA teams with a contractor or consortium, competitively selected, using a Cooperative Agreement

S Substantial contribution of resources by partners
S Consortium members bring wide range of technical skills and resources
S Cross waiver of liability is provided
S Does not require complicated Congressional approval process
S Well established, familiar implementation procedure
S Award cannot be protested to GAO like procurement contracts

W Competitive procurements preferred
W No profit permitted thus limiting self financing
W Questionable appropriateness for conducting operations, I&T
W Functional applicability only if in direct support of R&D
W Less freedom regarding patent rights
W More Federal regulations are imposed

Path II: A contractor or consortium is chartered by Congress through a form of an Other Transaction

S Avoids most regulations including FAR
S Only government-wide rules apply
S Has flexibility regarding intellectual property rights
S Less restrictive financial management procedures permitted
S Consortium members bring wide range of technical skills and resources
S Cost sharing reduces overall cost to government
S Allows NASA participation as team member
S Profit permitted
S Use of commercial business practices permits streamlining

W No precedent for Congressional action
W Cultural resistance, particularly from upper management, can be expected
W Requires significant amount of "trust" in lieu of controls

W Diminishes NASA management involvement
W Questionable if contracts or grant could not be used
W Although applicable for innovative work, questionable appropriateness for routing ops, I&T
W Legal validity is always a question
W Requires Congressional legislative definition, particularly if R&D is not the only purpose

Path III: Granting a state the authority to create a Government Corporation to run the space station.

S States can provide internal resources with less wrangling
S Freed from government employment rules, FOIA problems, FAR provisions
S Liability can be assumed by state
S State procurement mechanisms are no more restrictive than federal entities

W Profit or loss becomes state residents (or stockholders) property, making it a political issue.
W Best facilitates and experience are not necessarily state property
W R&D and intellectual property are not usual domain of states

Path IVA: Congressional approval for a new Government Sponsored Enterprise

S Can serve the purely business-like objectives with efficiency
S Independence from NASA
S Federal legislation can obviate most of the typical hurdles to efficiently doing business.

W Requires strong business objectives and profit goals
W Businesslike/Commercial nature of many of these enterprises may not be the most conducive to R&D (or other objectives) profit motive may not be appropriate.
W GSE's are usually financial in nature

Path IVB: Congress franchises a new Cooperative

S Can serve the multiple purposes of Technology Transfer, Research and Development, and service to scientific community without undue bureaucracy
S Membership can set objectives without government scrutiny
S Privatization endeavor is best taken away from under government oversight
S Independence from NASA

W Commercial viability of enterprise is less certain; often consists of less working capital
W Membership rule is more complex and decision making often less swift
W Special provisions required for non-signatory user access to ISS.

Path IVC: Congress establishes a dedicated Government Corporation

S Clear charter to accomplish objectives is best obtained via federal legislation
S Can serve the multiple purposes of Technology Transfer, Research and Development, and service to scientific community without undue bureaucracy
S Privatization endeavor is best taken away from under government oversight
S Independence from NASA

W Requires heavy lobbying efforts
W Businesslike/Commercial nature of many of these enterprises may not be the most conducive to R&D (or other objectives) profit motive may not be appropriate.
W Must turn a profit and have clear paths to profit making

5.2. Management Metrics

If order to rank the various approaches, it is useful to have an objective set of metrics. The following management metrics have been derived from a basic consideration of the operation of an NGO and are an expansion on the three objectives for using an NGO introduced in Section 2.2. These may be necessary considerations but by no means sufficient.

Table 5-1: Management Metrics

Staff Expertise
Ability to change workforce nature and character to accommodate changing task load
Pay scale and benefit flexibility to acquire required talent and experience
Intellectual Property Rights
Control of proprietary or experimental information and plans
Rights of ownership to products or results
Situational Flexibility
Responsivity to unanticipated requirements
Degree of externally imposed procedures or processes for procurement
Growth Potential
Ability to refocus organization to accomplish changing or new tasks
Charter constraints against new endeavors
Funding Constraints
Charter constraints against obtaining new revenue sources
Ability to expand or contract budgets to meet needs
Motivation
Capability of re-investing based on utilization returns
Motivation for reducing cost rather than maintaining status quo
Overhead Control
Ability to divest or tailor support resources or facilities to minimize costs
Control of non-ISS related, unfunded activities or work within the organization
Number of external interfaces involved to accomplish ISS utilization
Assurance
Ability to guarantee schedules and support
Capability of indemnifying user losses

5.3. Observations

Although the purpose of this study is to provide factual basis for selecting the option and implementation path for the NGO, and not to make a specific recommendation, two examples are selected from the literature review as reasonable paradigms for the NGO purposes. They are the Florida Spaceport Authority and INTELSAT. The former provides user services in a reduced cost environment for a national customer base. Although partially subsidized by the State, it expects to charge user fees for payload-launcher integration, and launch services. It operates "outside the gate" [19]with reduced procurement and regulatory requirements for the user. It should be noted, however, that the Air Force has donated two launch pads for its use without imposing the usual safety regulations or prioritization constraints thereby further reducing the expected cost to user for launching their payloads. The NGO, if NASA continues to operate the ISS, would still be encumbered by the constraints and regulations associated with using NASA property. From an international perspective, INTELSAT is noteworthy because it deals with the utilization of resources jointly held by the international community and involves an international "customer" base both situations exactly apply to ISS utilization. Efficient utilization of the ISS requires streamlining management – the focus of this trade study. But further cost reductions can be accomplished by first reducing the complexity associated with the operations (including planning, scheduling, integration testing, etc.), i.e., streamlining the functionality provided by the NGO and secondly, minimizing the number of interfaces which must be maintained and controlled including interfacing separate national management organizations. A centralized management entity, such as an INTELSAT-like corporation comprised of member countries that have contributed resources to the ISS, is one way to accomplish this efficiency. This centralized approach presumes that individual member contributions become held jointly by the corporation for use by any selected user from any member state or elsewhere from a resource pool allocated for non-member use.

[19] FSA is planning to build a facility at KSC for instrument integration in support of the ISS.

6. PRACTICAL ASPECTS

This section establishes a provisional operational baseline as reference in comparing the suitability of the various options. The baseline is comprised of an operational concept and the functional requirements, expressed in terms of the needs of all stakeholders.

6.1. Operations Concept

The NGO is assumed to be entirely self-sufficient providing for its own facilities, infrastructure support, human resources, and personnel management. It serves to provide liaison between all ISS users — scientists, technology developers, and commercial firms — and the ISS and STS operations/management organizations, as well as, interfacing with NASA, Congress and the press. It is assumed that NASA and the NGO are cooperative partners, not contractor and customer, in the utilization task of the ISS. It maintains a public outreach program, including a major Website, for educating and involving the public in the accomplishments of the ISS. Further, it is proactive in promoting opportunities using the ISS and in developing new sources of funding independently of NASA. The NGO is assumed to be fully responsible for selecting (via a peer review process it underwrites) experiments and for providing and managing grants to successful proposers. The appropriate steering councils within the NGO provide the priorities and allocations with NASA enjoying a predefined ISS resource allocation as its payment for granting exclusive ISS utilization control to the NGO through a reverse CAN procedure. The NGO serves as the source of planning information to NASA for future ISS requirements or enhancements.

The NGO represents a one-stop, all inclusive source of information and expertise that is available to experimenters to a) design their payload to interface properly with the STS delivery system and the ISS payload accommodations, b) operate or control their payloads from their home institutions, and c) receive experiment data electronically. Experimenters are presumed to be inexperienced. It is assumed that the NGO staff does not perform experiments as an IR&D activity.

Engineering staffing levels at the NGO presume that ISS users accomplish all design, development and analytical integration at their home institutions. NGO staff is assigned to each project to assure that appropriate interfaces, reference data, and integration requirements are provided from the start of the project. Engineering expertise is made available for a) critical review junctures for the project and b) during actual experiment integration testing. The NGO maintains a significant simulation capability that can be downloaded to the experimenters but the assumption is that the ground based integration facility is located elsewhere, say, at KSC. The NGO maintains an information system to support all engineering development work.

Operational procedures and a generic experiment command capability is maintained and updated as required by the NGO to enable remote operation of experiments. Some payload control facilities are available at the NGO for use primarily during emergency situations or when communication failures arise. In general, experimenters operate from their home institutions or through the ISS astronauts. For experiments involving real-time operators onboard ISS, the NGO coordinates training with JSC and supports the development of special flight support equipment. The NGO arranges for secure communication connectivity between the user's institution and their experiment. All real-time (or recorded playback) data are processed within the NGO to remove communication artifacts followed by retransmission to the user. In the process, all data transactions are logged and archived for reference and accounting. Except for short term data buffering, experiment or science data are not archived at the NGO.

The NGO maintains the database of experiment resource requirements, operational schedules and critical interface constraints to facilitate rapid reallocation of ISS resources due to experiment state change. The timeline is made available for NASA scheduling functions.

6.2. Interface Requirements

Table 6-1 identifies the key interfaces with the NGO and the nature of the interactions. The comparable Work Breakdown Structure derived from the Reference Model is given in Appendix A.

Table 6-1: Interface Requirements

	The ISS NGO shall:
General Public	Administer education and public outreach activities
	Provide web based tracking device
	Provide general information on current experiments
Users	Manage and support peer review of proposals
	Manage awards and grants
	Maintain and provide general contract terms for use by experimenters
	Provide status and performance characteristics of the ISS payload accommodations
	Publicize opportunities and publish AO's
Stock holders	Maintain financial records, annual reports
	Hold meetings, elections of board of directors
	Establish strategic financial goals
	Maintain financial accounting system
Congress	Maintain or improve hierarchy in national funding priorities
	Promote legislation to enhance operations
	Report on accomplishments
	Respond to inquiries
Press	Hold briefings on new experiments

	Provide releases regarding accomplishments
	Respond to inquiries
Staff	Manage hiring and benefits program
	Provide logistics and facility maintenance
	Provide computer and network maintenance
	Provide security
	Provide training
	Support software procurement and development
	Provide procurement support
P/L Operations Team	Provide payload operators if requested
	Provide operations and interface documentation
	Participate in and certify operational procedure development
	Participate in and certify integration testing of payloads
	Arrange and provide training
	Provide connectivity to remote facilities for data, voice and video
	Provide command and control facilities for payload operations
	Provide for an interface to ISS simulators for training
	Process and distribute downlinked data
	Archive event log information
	Maintain directories or catalogues of operational data
	Maintain and distribute operational reference database
Payload Developers	Provide technical interface definitions and specifications
	Maintain manifests and schedules
	Provide for an interface to ISS simulators for payload development
	Support payload analytic integration
	Maintain and disseminate data and communication standards
Program Office	Provide status against predefined metrics
	Maintain and report budget
	Provide long term planning information regarding utilization
	Provide utilization statistics
ISS operators	Serve as the primary interface between ISS operations and experimenters
	Participate and support payload integration
	Coordinate experiment and/or payload scheduling and rescheduling
	Support anomaly analysis, diagnosis, and correction
	Maintain and provide payload resource requirements database
	Maintain payloads interface specifications
ISS management	Provide short and long term utilization plans
	Support ISS utilization planning
STS office	Maintain payloads interface specifications
	Support payload integration testing
	Provide monitoring and control of payloads in Shuttle
	Coordinate development, test, and integration of payload handling equipment
	Support analytical integration of payloads
	Maintain payload manifest schedule
	Negotiate manifest changes
Venture capitalists	Maintain and provide business plan
	Support development of experimenters business plan
	Maintain contact list
	Review and approve contract between experimenter and VC
	Administrate trust fund

Board of Directors	Provide performance and financial status reports periodically Report on NGO personnel performance
Support contractors	Oversee budget and performance Provide technical management
International partners	Maintain and support revisions to MOU Provide facilities and administrative support to the international office at NGO Participate in reallocation of resources

6.3. Comparison of Characteristics

Table 6-2 is a sample listing of a multi-dimensional characterization or attributes of the NGO implementation approaches. In themselves, they do not represent a quantifiable set of metrics for selection but help to differentiate among the approaches.

Table 6-2: Implementation Summary

	Govt Sponsored Enterprise	**Cooperative**	**Govt Corp**	**State sponsored Authority**	**Independent Consortium**	**NASA Institute**	**NASA Division**
	An organization, chartered and franchised by the government that uses private funding to perform the tasks associated with ISS utilization	An organization established under state law and funded by members who are involved in like activities with equal management rights; franchised by the government.	A federally funded entity established by Congress to perform the ISS utilization task.	An organization partially or wholly sponsored by a state legislature with or without a NASA franchise.	An organization of public and private entities that cost shares with the government; management oversight is provided by members	A government related entity funded and established specifically to perform the ISS utilization task and associated R&D.	A branch of an existing NASA organization, reporting to NASA management, and staffed by civil servants, to perform the ISS utilization task.
Example	Fannie Mae	INTELSAT	COMSAT, IDRC AMTRAK	Florida Spaceport Authority	Analogous to USRA	GISS , NASA Astrobiology Institute	
NASA participation	No	Yes - voting	Yes - Nonvoting	Board membership	As partner	Direct control	Direct control
New Facilities	Yes	Yes	Yes	Yes, state provided	Not necessarily	Not necessarily	On-site at Center
Independent user access	Yes	Yes; possibly different rates	Yes	Yes	More difficult	More difficult	More difficult
Mgmt Structure	Internal BOD	Member "governing council"	Appointed BOD	Appointed BOD	Consortia member BOD	Contractor BOD w/NASA oversight	NASA mgmt
Independent Oversight	Per terms of franchise	Per terms of franchise	Congress	Per terms of franchise	Per terms of franchise	Peer group	NASA Centers plus peer
Non-recurring Cost	None to NASA	Member funded	Federal funded	NASA partially subsidizes	NASA partially subsidizes	Existing facility?	Existing facility
Recurring Cost	User pays	Members and users pay	User pays	State and NASA subsidized	User pays and NASA subsidizes	NASA pays	NASA pays
Regulatory constraints	Standards of incorporation	Standards of incorporation	Federal level w/waivers	State level	Federal level w/waivers	Federal level	Federal level
Impact on NASA	Loss of control	Loss of control	Loss of control Problematic I/F	Adverse politics	Less control	Problematic I/F with CDC's	Growth of ops responsibility

APPENDICES

7. Appendices

Appendix A: Work Breakdown Structure

This WBS is derived from an analysis of the NASA Reference Model for an NGO

1	**0**	**Management**
1	1	Report on cost/schedule/performance
1	2	Interface with Government organizations
1	3	Manage support contracts
1	4	Manage operations contract
1	5	Select and administer resident personnel
1	6	Manage and administer a visiting scientist program
1	7	Maintains proprietary procedures
1	8	Provide liaison with commercial sector
1	9	Administer commercial ventures
2	**0**	**Grant and Finance**
2	1	Assist in the evaluation and financing of entrepreneurial ventures
2	2	Analyze and support selection of proposed experiments
2	3	Analyze and support selection of technology experiments
2	4	Issue and administer Instruments of Agreement
2	5	Definition and assignment of orbital opportunities
2	6	Manages private capital funds (Trust)
2	7	Selects ventures for funding
2	8	Finances private ventures
3	**0**	**Operations**
3	1	Define orbital opportunities
3	2	Support ISS R/T operations
3	3	Perform R/T operations replanning
3	4	Provide tactical planning for operations
3	5	Maintain the Mission model
3	6	Generate utilization metrics
3	7	Manage operations of payload flight and ground systems
3	8	Develop requirements for payload operator skills/expertise
3	9	Manage payload data processing and distribution
3	10	Schedules experiments or projects
3	11	Process data and generate data products
3	12	Manage data archive
4	**0**	**Education**
4	1	Communicate benefits of orb environment to public (advocacy role)
4	2	Interface with media
4	3	Conduct and support educational programs
5	**0**	**Systems Engineering and Development**
5	1	Provide technical interface for external projects

5	2	Manage design, development, test, and integration of sponsored payload elements
5	3	Provide recommendations for space and ground system enhancements, changes
5	4	Manage physical, analytical and operation integration of payloads/experiments
5	5	Oversee and approve payload integration plans and flight personnel assignments
5	6	Develop new flight assets
5	7	Maintain ISS utilization requirements
5	8	Maintain standards
6	**0**	**IR&D**
6	1	Developing the R&D program plan
6	2	Propose and perform IR&D

Appendix B: Cost-Reimbursable FAR

FEDERAL ACQUISITION REGULATION

If this order is placed under a Government prime contract or a federally-funded subcontract, the following clauses set forth in the Federal Acquisition Regulation (FAR) and the Department of Defense Federal Acquisition Regulation Supplement (DFARS), in effect on the data of this order, are incorporated herein by reference with the same force and effect as if given in full text. Where necessary to make the context of these clauses applicable to this order, the term "contractor" shall mean "seller", the term "contract" shall mean "this order", and the terms "Government", "contracting Officer" and equivalent phrases shall mea "buyer". Seller hereby agrees to flowdown the applicable FAR/DFARS clauses to its lower-tier subcontractors.

COST REIMBURSEMENT FAR/DFARS CLAUSES

1. APPLICABLE TO ALL ORDERS

52.202-1 Definitions
52.203-3 Gratuities
52.203-5 Covenant Against Contingent Fees
52.203-6 Restrictions on Subcontractor Sales to the Government
52.203-7 Anti-Kickback Procedures
52.204-2 Security Requirements
52.204-4 Printing/Copying Double-sided on Recycled Paper
52.211-5 New Material
52.211-15 Defense Priority and Allocation Requirements
52.215-14 Integrity of Unit Prices
52.216-7 Allowable Cost and Payment
52.216-8 Fixed Fee
52.216-10 Incentive Fee
52.216-24 Limitation of Government Liability
52.216-25 Contract Definitization
52.222-1 Notice to the Government of Labor Disputes
52.222-2 Payment for Overtime Premiums*

52.222-4 Contract Work Hours and Safety Standards Act, "Overtime Compensation*

52.223-3 Hazardous Material Identification...etc.

52.223-13 Certification of Toxic Chemical Release Reporting

52.223-14 Toxic Chemical Release Reporting

52.224-2 Privacy Act

52.225-3 Buy American Act Supplies

52.225-7 Balance of Payments Program

52.225-11 Restrictions on Certain Foreign Purchases

52.227-3 Patent Indemnity

52.227-6 Royalty Information

52.227-9 Refund of Royalties

52.227-10 Filing of Patent Applications-Classified Subject Matter

52.227-11 Patent Rights-Retention by the Contractor (Short Form)

52.227-12 Patent Rights-Retention by the Contractor (Long form)

52.227-13 Patent Rights-Acquisition by the Government

52.228-7 Insurance-Liability to Third Persons

52.229-3 Federal, State, and Local Taxes

52.232-11 Extras

52.232-20 Limitation of Cost

52.233-2 Service of Protest

52.233-3 Protest After Award, Alternate 1

52.242-1 Notice of Intent to Disallow Costs

52.242-15 Stop-Work Order

52.243-2 Changes-Cost Reimbursement

52.243-3 Changes-Time and Materials or Labor-Hours

52.243-7 Notification of Changes

52.244-6 Subcontracts for Commercial Items and Commercial Components

52.245-5 Government Property (Cost-Reimbursement, Time and Material, or Labor-Hour Contracts)

52.245-17 Special Tooling

52.245-18 Special Test Equipment

52.246-1 Contractor Inspection Requirements**

52.249-6 Termination (Cost Reimbursement)

*Overtime premium cost is not authorized unless a specific dollar amount therefore is agreed to by the parties.

**Applicable to procurements not exceeding $25,000

2. APPLICABLE TO ALL ORDERS OVER $2,500

52.219-6 Notice of Total Small Business Set-Aside
52.222-3 Convict Labor
52.222-36 Affirmative action for Handicapped Workers
52.225-11 Restrictions on Certain Foreign Purchases

3. APPLICABLE TO ALL ORDERS OVER $10,000

52.215-2 Audit-Negotiation
52.219-8 Utilization of Small -Business Concerns...etc.
52.222-20 Walsh-Healy Public Contracts Act
52.222-21 Certification of Nonsegregated Facilities
52.222-26 Equal Opportunity*
52.222-35 Affirmative Action for Special Disabled and Vietnam Era Veterans
52.222-37 Employment Reports on Special Disabled Veterans ...etc.

*Applicable if the aggregate value of buyer awards is in excess of $10,000 during any 12-month period

4. APPLICABLE TO ALL ORDERS OVER $25,000

52.203-10 Price or Fee Adjustment for Illegal or Improper Activity
52.209-6 Protecting the Government's Interest...etc.
52.223-5 Pollution Prevention & Right-to-Know
52.223-6 Drug-Free Workplace*
52.227-1 Authorization and Consent
52.227-2 Notice and Assistance Regarding Patent and Copyright Infringement
52.244-5 Competition in Subcontracting
52.246-3 Inspection of Supplies-Cost Reimbursement
52.246-5 Inspection of Services-Cost Reimbursement
52.246-6 Inspection-Time and Material and Labor Hour
52.246-8 Inspection of R&D-Cost Reimbursement
52.246-16 Responsibility for Supplies

52.246-23 Limitation of Liability

52.246-24 Limitation of Liability-High Value Items

52.246-25 Limitation of Liability-Services

52.247-63 Preference for U.S. Flag Air Carriers

*Applicable to an individual regardless of the dollar amount of the order.

5. APPLICABLE TO ALL ORDERS OVER $100,000

52.203-11 Certification and Disclosure- Regarding Payments to ...

52.203-12 Limitation on Payments to Influence Certain Federal Transactions

52.223-2 Clean Air and Water*

52.225-10 Duty-Free Entry

52.230-3 Disclosure and Consistency of Cost Accounting

52.230-4 Consistency in Cost Accounting Standards

52.248-1 Value Engineering

*Applicable if the procurement is $100,000 or more or is expected to exceed $100,000 in the following 12-month period

**Unless exempt in accordance with FAR 30.201-1(b)

6. APPLICABLE TO ALL ORDERS OVER $500,00

52.215-11 Price Reduction for Defective Cost or Pricing

52.215-12 Subcontractor Cost or Pricing Data

52.215-13 Subcontractor Cost or Pricing Data-Modifications

52.219-9 Small Business and Small Disadvantaged Business Subcontracting Plan*

52.219-16 Liquidated Damages-Small Business Subcontracting Plan*

*Not applicable to small businesses

7. APPLICABLE TO ALL ORDERS OVER $1,000,000

52.222-28 Equal Opportunity Preaward Clearance of Subcontracts

8. APPLICABLE TO ORDERS AT THE THRESHOLDS SPECIFIED IN THE DFARS CLAUSES

252.203-7001 Special Prohibition on Employment

252.219-7000 Small Disadvantaged Business Concern...etc.

252.223-7004 Drug-Free Work Force

252.225-7000 Buy American Act and Balance of Payments Program

252.225-7002 Qualifying Country Sources as Subcontractors

252.225-7006 Buy American Act-Trade Agreements Act...etc.

252.225-7009 Duty-Free Entry-Qualifying Country...etc.

252.225-7012 Preference for Certain Domestic Commodities

252.225-7014 Preference for Domestic Specialty Metals

252.225-7015 Preference for Domestic Hand or Measuring Tools

252.225-7016 Restriction on Acquisition...etc.

252.227-7013 Rights in Technical Data

252.227-7030 Technical Data-Withholding of Payment

252.246-7001 Warranty of Data

252.247-7023 252.247-7023 Transportation of Supplies by Sea

252.247-7024 Ordering From Government Supply Sources

Appendix C: Fixed Price FAR

FEDERAL ACQUISITION REGULATION

If this order is placed under a Government prime contract or a federally-funded subcontract, the following clauses set forth in the Federal Acquisition Regulation (FAR) and the Department of Defense Federal Acquisition Regulation Supplement (DFARS), in effect on the date of this order, are incorporated herein by reference with the same force and effect as if given in full text. Where necessary to make the context of these clauses applicable to this order, the term "contractor" shall mean "seller," the term "contract" shall mean "this order," and the terms "Government," "contracting officer" and equivalent phrases shall mean "buyer." Seller hereby agrees to flowdown the applicable FAR/DFARS clauses to its lower-tier subcontractors.

FIXED PRICE FAR/DFARS CLAUSES

1. APPLICABLE TO ALL ORDERS

52.202-1 Definitions
52.203-3 Gratuities
52.203-5 Covenant Against Contingent Fees
52.203-6 Restrictions On Subcontractor Sales to the Government
52.203-7 Anti-Kickback Procedures
52.204-2 Security Requirements
52.204-4 Printing/Copying Double-Sided on Recycled Paper
52.211-5 New Material
52.211.15 Defense Priority and Allocation Requirements
52.215-14 Integrity of Unit Prices
52.216-24 Limitation of Government Liability
52.216-25 Contract Definitization
52.222-1 Notice to the Government of Labor Disputes
52.222-4 Contract Work Hours and Safety Standards Act-Overtime Compensation
52.223-3 Hazardous Material Identification...etc.
52.223-13 Certification of Toxic Chemical Release Reporting

52.223-14 Toxic Chemical Release Reporting

52.224-2 Privacy Act

52.225-3 Buy American Act-Supplies

52.225-7 Balance of Payments Program

52.225-11 Restrictions on Certain Foreign Purchases

52.225-13 Notice of Buy American Act, . . . etc.

52.227-3 Patent Indemnity

52.227-6 Royalty Information

52.227-9 Refund of Royalties

52.227-10 Filing of Patent Applications-Classified Subject Matter

52.227-11 Patent Rights-Retention by the Contractor (Short Form)

52.227-12 Patent Rights-Retention by the Contractor (Long Form)

52.227-13 Patent Rights-Acquisition by the Government

52.229-3 Federal, State, and Local Taxes

52.232-1 Payments

52.232-11 Extras

52.233-2 Service of Protest

52.233-3 Protest After Award

52.242-15 Stop-Work Order

52.243-1 Changes-Fixed Price

52.243-7 Notification of Changes

52.244-6 Subcontracts for Commercial Items and Commercial Components

52.245-2 Government Property (Fixed Price Contracts)

52.245-9 Use and Charges

52.245-17 Special Tooling

52.245-18 Special Test Equipment

52.246-1 Contractor Inspection Requirements*

52.249-1 Termination for Convenience of the Government (Fixed Price) Short Form)**

52.249-4 Termination for Convenience of the Government (Service) (Short Form)

*Applicable to procurements not exceeding $25,000

**Applicable to procurements not exceeding $100,000

2. APPLICABLE TO ALL ORDERS OVER $2,500

52.219-6 Notice of Total Small Business Set-Aside

52.222-3 Convict Labor

52.222-36 Affirmative Action for Handicapped Workers

52.225-11 Restrictions on Certain Foreign Purchases

3. APPLICABLE TO ALL ORDERS OVER $10,000

52.214-26 Audit and Records-Sealed Bidding

52.215-1 Instructions to Offerors-Competitive

52.215-2 Audit-Negotiation

52.222.-20 Walsh-Healy Public Contracts Act

52.222-21 Certification of Nonsegregated Facilities

52.222-26 Equal Opportunity*

52.222-35 Affirmative Action for Special Disabled and Vietnam Era Veterans

52.222-37 Employment Reports on Special Disabled Veterans...etc.

*Applicable if the aggregate value of buyer awards is in excess of $10,000 during any 12-month period

4. APPLICABLE TO ALL ORDERS OVER $25,000

52.203-10 Price or Fee Adjustments for Illegal or Improper Activity

52.209-6 Protecting the Government's Interest...etc.

52.219-8 Utilization of Small Business Concerns...etc.

52.223-5 Pollution Prevention and Right-to-Know

52.223-6 Drug-Free Workplace*

52.227-1 Authorization and Consent

52.227-2 Notice and Assistance Regarding Patent and Copyright Infringement

52.228-5 Insurance-Work on a Government Installation

52.244-5 Competition in Subcontracting

52.246-2 Inspection of Supplies-Fixed Price

52.246-4 Inspection of Services-Fixed Price

52.246-7 Inspection of Research and Development-Fixed Price

52.246-16 Responsibility for Supplies

52.246-23 Limitation of Liability

52.246-24 Limitation of Liability-High Value Items

52.246-25 Limitation of Liability-Services
52.247-63 Preference for U.S. Flag Air Carriers
52.249-8 Default (Fixed Price Supply and Service)
52.249-9 Default (Fixed Price Research and Development)

*Applicable to an individual regardless of the dollar amount of the order

5. APPLICABLE TO ALL ORDERS OVER $100,000

52.203-8 Cancellation, Recision, and Recovery...etc.
52.203-11 Certification and Disclosure-Regarding Payments to ...
52.203-12 Limitation of Payments to Influence Certain Federal Transactions
52.223-2 Clean Air and Water*
52.225-10 Duty-Free Entry
52.230-3 Disclosure and Consistency of Cost...etc.
52.230-4 Consistency in Cost Accounting Practices
52.248-1 Value Engineering
52.249-2 Termination for Convenience of the Government (Fixed Price)

*Applicable if the procurement is $100,000 or is expected to exceed $100,000 in the following 12-month period
**Unless exempt in accordance with FAR-30.201-1(b)

6. APPLICABLE TO ALL ORDERS OVER $500,000

52.214-27 Price Reduction for Defective Cost or Pricing Data-Modifications (Sealed Bidding)
52.214-28 Subcontractor Cost or Pricing Data-Modifications (Sealed Bidding)
52.215-10 Price Reduction for Defective Cost or Pricing Data
52.215-11 Price Reduction for Defective Cost or Pricing
52.215-12 Subcontractor Cost or Pricing Data
52.215-13 Subcontractor Cost or Pricing Data -Modifications
52.219-9 Small Business and Small Disadvantaged Business Subcontracting Plan*
52.219-16 Liquidated Damages-Small Business Subcontracting Plan*

*Not applicable to small businesses

7. APPLICABLE TO ALL ORDERS OVER $1,000,000

52.222-28 Equal Opportunity Preaward Clearance of Subcontracts

8. APPLICABLE TO ORDERS AT THE THRESHOLDS SPECIFIED IN THE DFARS CLAUSES

252.203-7001 Special Prohibition on Employment
252.219-7000 Small Disadvantaged Business Concern...etc.
252.223-7004 Drug-Free Work Force
252.225-7000 Buy American Act and Balance of Payments Program
252.225-7002 Qualifying Country Sources as Subcontractors
252.225-7006 Buy American Act-Trade Agreements Act...etc.
252.225-7009 Duty-Free Entry-Qualifying Country...etc.
252.225-7012 Preference for Certain Domestic Commodities
252.225-7014 Preference for Domestic Specialty Metals
252.225-7015 Preference for Domestic Hand or Measuring Tools
252.225-7016 Restriction on Acquisition...etc.
252.227-7013 Rights in Technical Data Noncommercial
252.227-7030 Technical Data-Withholding of Payment
252.246-7001 Warranty of Data
252.247-7023 Transportation of Supplies by Sea
252.251-7000 Ordering From Government Supply Sources

Appendix D: Exemptions from the FOIA

§ 1206.300 Exemptions.

(a) Under 5 U.S.C. 552(b) Agency records falling within the exemptions of paragraph (b) of this section are not required to be made available under this part. Such records may nevertheless be made available if it is determined that such actions would not be inconsistent with a purpose of the exemption (see § 1206.208)

(b) The requirements of this part to make Agency records available do not apply to matters that are—

(1)(i) Specifically authorized under criteria established by an Executive order to be kept secret in the interest of national defense or foreign policy and (ii) are in fact properly classified pursuant to such Executive order;

(2) Related solely to the internal personnel rules and practices of NASA;

(3) Specifically exempted from disclosure by statute (other than 5 U.S.C. 552), provided that such statute (i) requires that the matters be withheld from the public in such a manner as to leave no discretion on the issue, or (ii) establishes particular criteria for withholding or refers to particular types of matters to be withheld;

(4) Trade secrets and commercial or financial information obtained from a person and privileged or confidential;

(5) Interagency or intra-agency memorandums or letters which would not be available by law to a party other than an agency in litigation with NASA;

(6) Personnel and medical files and similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy;

(7) Records or information compiled for law enforcement purposes, but only to the extent that the production of such law enforcement records or information- (i) Could reasonably be expected to interfere with enforcement proceedings, (A) Whenever a request is made which involves access to these records and-- (1) The investigation or proceeding involves a possible

violation of criminal law; and (2) There is reason to believe that the subject of the investigation or proceeding is not aware of its pendancy, and disclosure of the existence of the records could reasonably be expected to interfere with enforcement proceedings, the Agency may, during only such time as that circumstance continues, treat the records as not subject to the requirements of this section. (ii) Would deprive a person of a right to a fair trial or an impartial adjudication, (iii) Could reasonably be expected to constitute an unwarranted invasion of personal privacy, (iv) Could reasonably be expected to disclose the identity of a confidential source, including a State, local, or foreign agency or authority or any private institution which furnished information on a confidential basis, and, in the case of a record or information compiled by criminal law enforcement authority in the course of a criminal investigation or by an agency conducting a lawful national security intelligence investigation, information furnished by a confidential source, (v) Would disclose techniques and procedures for law enforcement investigations or prosecutions, or would disclose guidelines for law enforcement investigations or prosecutions if such disclosure could reasonably be expected to risk circumvention of the law, or (vi) Could reasonably be expected to endanger the life or physical safety of any individual. Whenever informant records maintained by a criminal law enforcement agency under an informant's name or personal identifier are requested by a third party according to the informant's name or personal identifier, the Agency may treat the records as not subject to the requirements of this section unless the informant's status as an informant has been officially confirmed.

(8) Contained in or related to examination, operating, or condition reports prepared by, on behalf of, or for the use of an agency responsible for the regulation or supervision of financial institutions; or

(9) Geological and geophysical information and data, including maps, concerning wells.

§ 1206.301 Limitation of Exemptions.

a) This Part 1206 does not authorize the withholding of information or the availability of records to the public, except as specifically stated in this part.
b) Nothing in this part shall be construed as authority to withhold information from Congress.

Appendix E: Table of Acronyms

AIAA	American Institute of Aeronautics and Astronautics
ASA	Alabama Supercomputer Authority
AURA	Association of Universities for Research in Astronomy
BOD	Board of Directors
CAN	Cooperative Agreement Notice
CDC	Commercial Development Center
CFR	Code of Federal Regulations
COMSAT	Communications Satellite Corporation
CSC	Commercial Space Centers
CSOC	Consolidated Space Operations Contract
DARPA	Defense Advanced Research Project Agency
DFARS	Defense Federal Acquisition Regulation Supplement
DoD	Department of Defense
ESOP	Employee Stock Ownership Plan
Fannie Mae	Federal National Mortgage Association
FAR	Federal Acquisition Regulations
FCC	Federal Communication Commission
FFRDC	Federally Funded Research and Development Center
FHLB	Federal Home Loan Banks
FOIA	Freedom of Information Act
FSA	Florida Spaceport Authority
GAO	Government Accounting Office
GAS	Getaway Special
GC	Government Corporation
GCCA	Government Corporation Contract Act
GISS	Goddard Institute for Space Studies
GO	Government Organization
GSE	Government Sponsored Enterprise
GSFC	Goddard Space Flight Center
HST	Hubble Space Telescope
HTML	Hypertext Markup Language
HUD	Housing and Urban Development

IDRC	International Development Research Centre
IPA	Intergovernmental Personnel Agreements
IR&D	Internal Research and Development
ISS	International Space Station
JEA	Joint Endeavor Agreement
JSC	Johnson Space Center
KSC	Kennedy Space Center
KTEC	Kansas Technology Enterprise Corporation
LARC	Langley Research Center
LeRC	Lewis Research Center/John Glenn Research Center
MSFC	Marshall Space Flight Center
NGO	Non-Government Organization
NOAO	National Optical Astronomy Observatories
OFHEO	Office of Federal Housing Enterprise Oversight
OMB	Office of Management and Budget
OPIC	Overseas Private Investment Corporation
OT	Other Transaction
P/L	Payload
R/T	Real-time
Sallie Mae	Student Loan Marketing Association
SOFIA	Stratospheric Observatory for Infrared Astronomy
STS	Space Transportation System (Shuttle)
TDRSS	Tracking Data Relay Satellite System
TRDA	Tellico Reservoir Development Agency
TVA	Tennessee Valley Authority
U.S.C.	United States Code
USRA	Universities for Space Research Association
VC	Venture capitalist